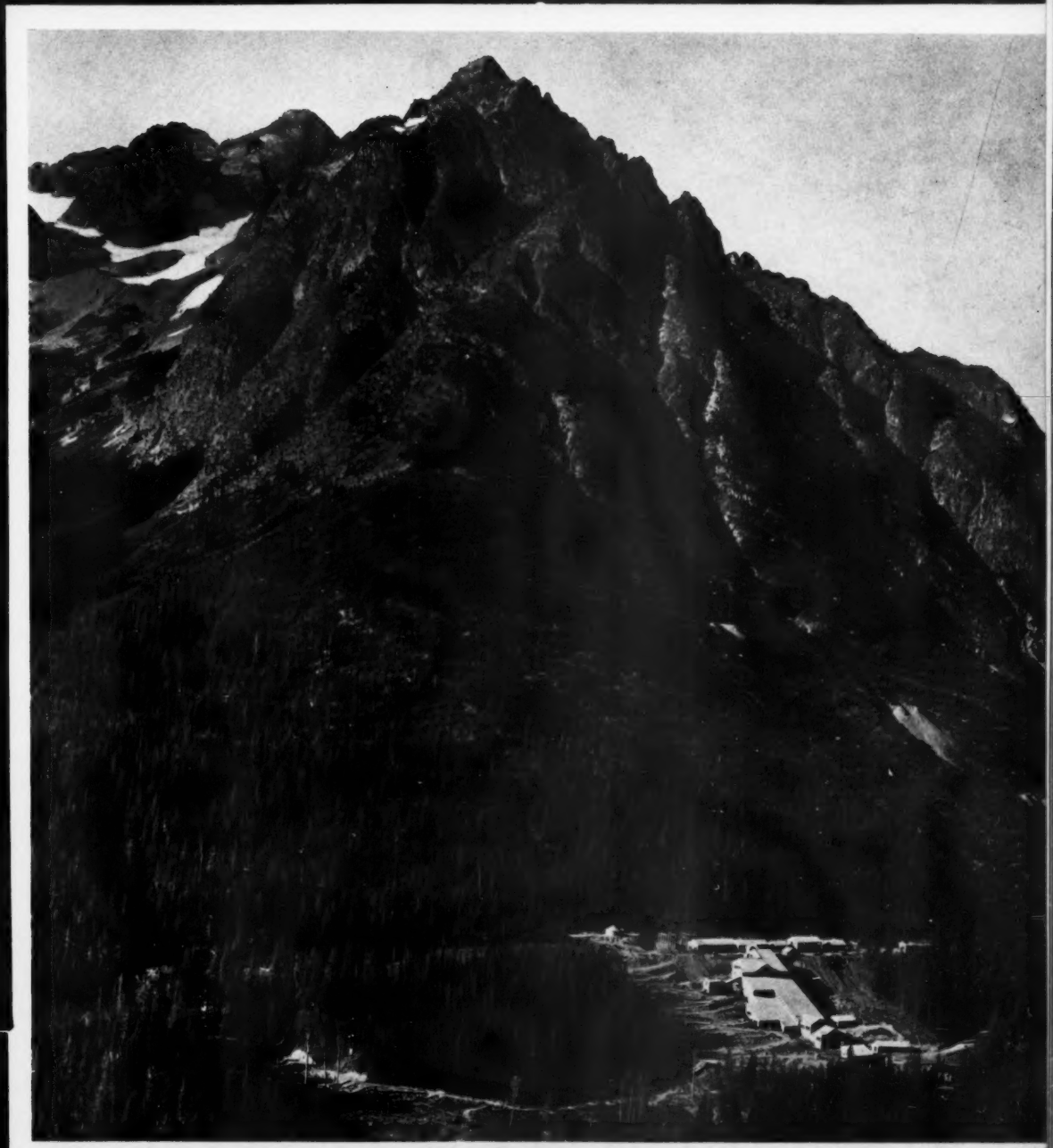
MINING CONGRESS JOURNAL



OFFICIAL

ICATION

THE YEAR'-1940 Vol.

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6¼ x 9 inches; approximately 375 pages; fully illustrated from cover to cover. A gold mine of latest information on such subjects as Mechanical Loading, Conveyor Mining, Surface Preparation, Equipment Maintenance, Safety, Face Preparation, Power Distribution, Roof Support, Strip Mining, Coal Utilization, Economic Problems, etc.

MINING CONGRESS JOURNAL

Vol. 26 MAY, 1940 No. 5

The 1940 Coal Show of the American Mining Congress, recently concluded in Cincinnati, was by all odds the finest and most successful ever staged. With a record-smashing attendance of 5,066 coal mine operators, manufacturers representatives and ladies; a program that represented the best collective thinking on vital problems before the industry, and a complete and colorful exposition of the multitudinous devices needed to mine coal most efficiently, the meeting epitomized the industry's determination to restore to King Coal his rightful share in supplying the country's power needs.

Turn to page 22-42 for a full account of the meeting, and a convenient digest of all papers presented.

CONTENTS

Opinions expressed by authors within these pages are their own, and do not necessarily represent those of the American Mining Congress

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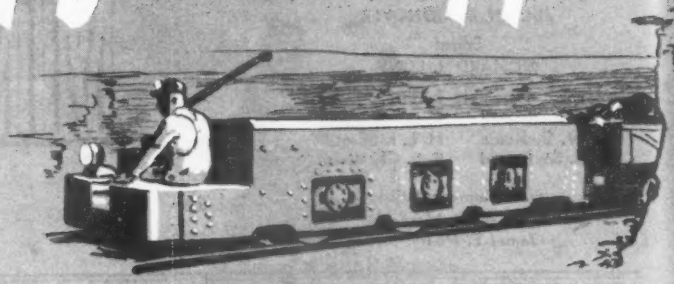
Member, Audit Bureau of Circulations.

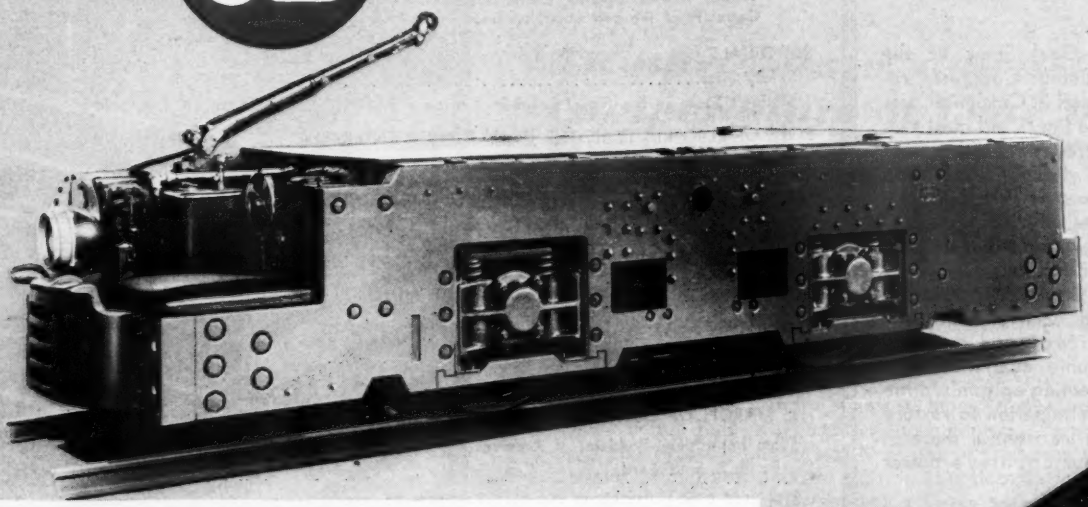
From working face to tipple...



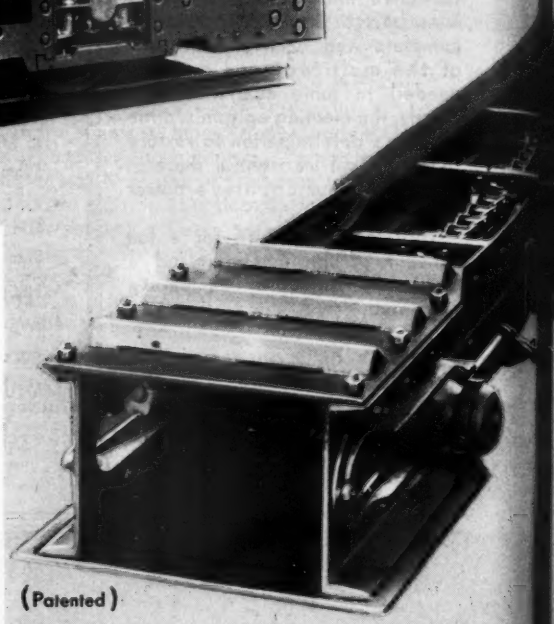
Engineered Economy
ALL ALONG THE LINE

THE JEFFREY MANUFACTURING

912-99 North Fourth Street,

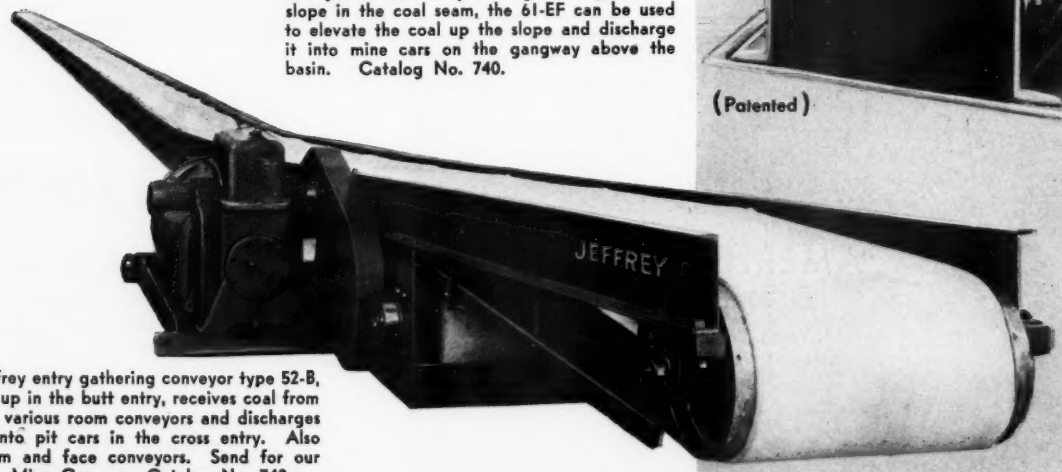


Here you see a Jeffrey 20-ton trolley locomotive with 2 motors of 150 H. P. each. This unit is equipped with anti-friction journal bearings, transverse equalizers and contactor control. Jeffrey has made a special study of mine locomotive use and adaptation . . . has developed a complete line for haulage and gathering service in trolley or storage battery type. Catalog No. 555.



(Patented)

Jeffrey elevating conveyor type 61-EF, especially designed for anthracite service. Maximum length is 250 feet and it has a capacity of 1 ton per minute. By driving a long, narrow slope in the coal seam, the 61-EF can be used to elevate the coal up the slope and discharge it into mine cars on the gangway above the basin. Catalog No. 740.

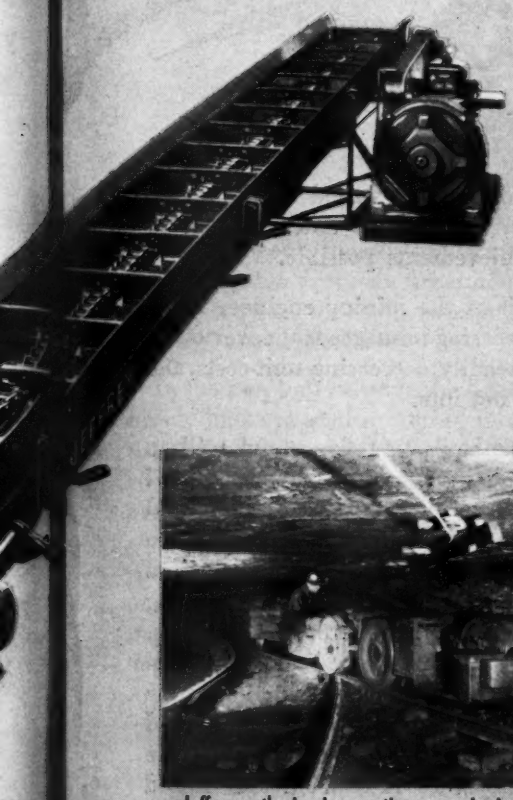


Jeffrey entry gathering conveyor type 52-B, set up in the butt entry, receives coal from the various room conveyors and discharges it into pit cars in the cross entry. Also room and face conveyors. Send for our new Mine Conveyor Catalog No. 740.

HIGH SPEED, ECONOMICAL HAULAGE IS MAINTAINED BY

JEFFREY LOCOMOTIVES AND CONVEYORS

COMPANY
Columbus, Ohio



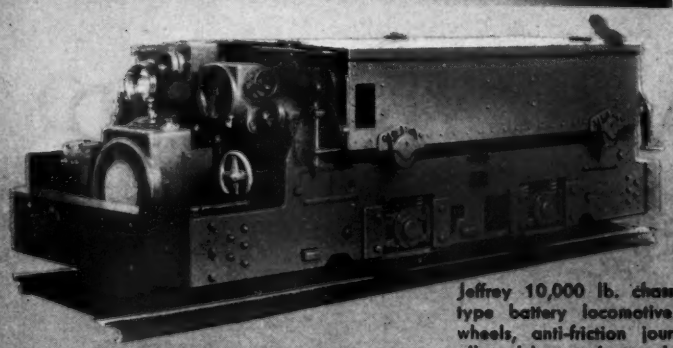
Jeffrey gathering locomotives come in sizes up to 8 tons. A 6-ton outside wheel type locomotive (low type) is illustrated above. Has two motors of 30 H. P. each.

Jeffrey equipment offers you an opportunity for increased profit throughout every phase of coal mine production.

● Whether coal is loaded directly into mine cars at the face or conveyed out through entries, Jeffrey "engineered economy" picks up at these points with a selection of standardized locomotives and heavy duty conveyors designed to maintain the same efficient production pace initially set at the face by Jeffrey cutters, drills and loaders.

Here then is a comprehensive line of transportation equipment designed for most efficient handling of coal from room or entry to tipple. Built with the same "engineered economy" as Jeffrey cutters, drills and loaders, these conveyors and locomotives complete the system of underground equipment and help insure a margin of profit for your operation.

Let Jeffrey engineers demonstrate how our equipment throughout the workings can build up profits for you. A consultation will in no way obligate you.

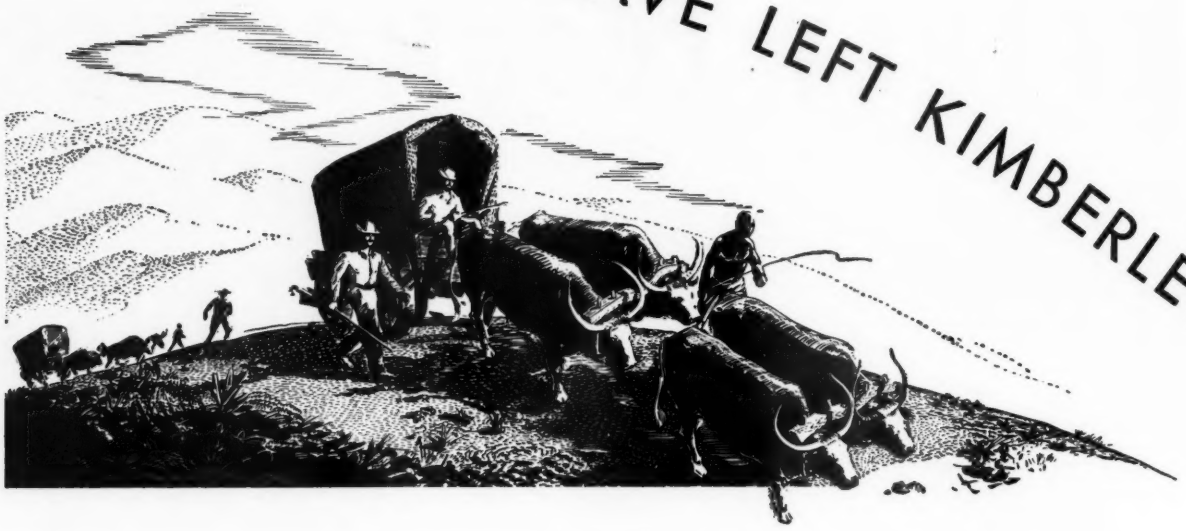


Jeffrey 10,000 lb. chassis permissible type battery locomotive. Has inside wheels, anti-friction journal bearings, all-steel battery box, unloading rollers, geared lid lifters and drip pan. Also

For continued efficiency, use spare parts identical point for point with those they replace...

JEFFREY SPARE PARTS ARE MANUFACTURED TO PRECISELY THE SAME HIGH STANDARDS AS GOVERN ORIGINAL EQUIPMENT

THEY'D NEVER HAVE LEFT KIMBERLEY



"Robinson's Cabbage Patch", Vogelstruisfontein, Geldenhuis, Driefontein and other famous farms might have gone undeveloped for years if the Rand pioneers had been able to core-drill a mile deep into the newly uncovered reef. Even those hardy argonauts could not have visioned profits from pennyweights instead of ounces!

Yet such was the calibre of the men who left the diamond fields of Kimberley to follow the glint of gold along the Rand that when it soon became evident that extremely high values did not persist with depth, they had the courage and resourcefulness to carry on.

The Rand is a story of magnificent accomplishments . . . a story of virgin veldt transformed into one of the world's most highly-organized industries within the life span of a man . . . a story of the most productive lode ever struck by a miner's pick where the fates dealt kindly with men of faith. But, above all else, the Rand is a story of management . . . safe, sane, sound management that effectively merged the varied talents of the mining engineer, metallurgist and financier to make today's achievements possible.

While the skill of the mining engineer made possible ever increasing tonnages from ever deepening shafts at steadily decreasing unit-costs, the metallurgist was not idle.

From Fred Struben's first five-stamp mill to today's juggernauts, a composite flow scheme of all the Rand mills would be a treatise on gold metallurgy. As surface enrichment gave way to refractory ore, amalgamation was supplemented by blanket concentration, followed by roasting and chlorination of the blanket concentrates. Recoveries increased from 64% to 74%. As grade went gradually lower, cyanidation came to the rescue. At the turn of the century, gold extraction reached 90%. Fine grinding and the all-sliming process were next tried and found universal acceptance for new mills toward the end of the World War period.

FOR FOUR PENNYWEIGHT GOLD

The search for fractional-pennyweight savings in both underground operations and reduction plants has gone steadily on, until today profits are being won from the treatment of ore which would be considered waste in many mining districts of the world.

In the past half century the Rand has produced nearly half the gold produced in the world since the days of Columbus. Yet, today, forty-odd Rand reduction works treat an aggregate tonnage of over 5,000,000 tons a month . . . with gold recovery of 92% to 98% and incredibly low operating costs. Today the Rand produces over a million ounces of gold every month from values averaging slightly over 4 dwt. per ton . . . hoisted from depths as great as 8,000 feet!

The essence of Rand metallurgical efficiency is unwavering adherence to the simple formula—cost plus residues—the same efficiency every mill can achieve by persistent search for fractional-percent cost reductions or increases in recovery.

In this ceaseless search for lower costs or higher recoveries Cyanamid Field Engineers are working with mill metallurgists in every mining field of the world. Backed by Cyanamid Ore Dressing Laboratory, Cyanamid Field Engineers bring a breadth of experience based on their cumulative knowledge of advances being made the world over plus a warmth of intelligent interest in helping to solve your beneficiation problems.

Whatever your particular milling problem, whether your ore can best be treated by flotation, by cyanidation or by a combination of these with older recovery methods, we invite you to consult Cyanamid Field Engineers.

* * * *

Ore Dressing Notes No. 10, soon to be issued, contains a review of several interesting metallurgical developments. We shall be glad to send a copy without obligation on request.

COMPANY
Chemical Service
NEW YORK

American Cyanamid Company
30 Rockefeller Plaza, New York, N. Y.

Please send me Ore Dressing Notes No. 10, when issued.

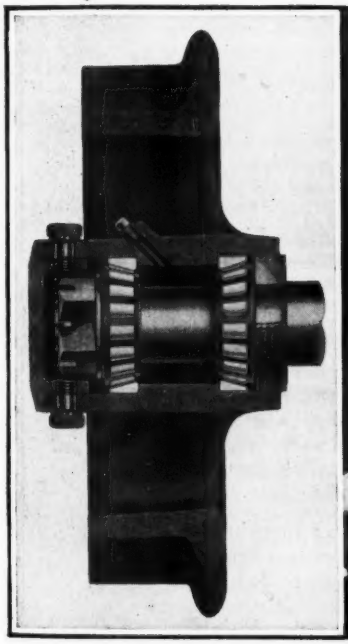
Name.....

Address.....

THE BEST DEFENSE AGAINST THRUST

In fencing it's "parry". In mine cars it's the TIMKEN Tapered Roller Bearing. Thrust is present in every mine car bearing application. In its milder form it can cause a lot of damage. When severe it may be vital. But mild or severe, thrust hasn't a chance with TIMKEN Bearings on guard in mine car wheels—and neither has friction, radial load or threat of misalignment. You need the complete protection of TIMKEN Bearings in your mine cars. Make sure you get it—then you'll get more and more Miles of Smiles as time goes on.

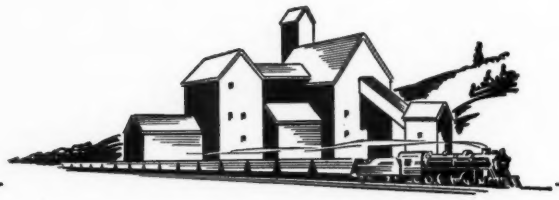
THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO



Typical TIMKEN Bearing application for mine car wheels.

TIMKEN
TAPERED ROLLER BEARINGS

Manufacturers of TIMKEN Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; TIMKEN Alloy Steels and Carbon and Alloy Seamless Tubing; and TIMKEN Rock Bits.



Safety First

PERHAPS no greater tribute to the efficiency of a sister organization could have been paid than that by the National Convention of the American Red Cross Association recently held in Washington, in passing without reference the mining industry in its discussions of accident prevention.

In the year 1907, at which time the first organized effort was begun looking to the creation of the Bureau of Mines, the fatality rate in the coal mining industry was 5.27 for each million tons of coal produced.

This was an appalling record, and the Bureau of Mines was created mainly to cope with that situation. It was at the Pittsburgh Convention of 1908 that the slogan "Safety First" was first used by the late John L. Cochrane in carrying on the publicity work of the Convention. The terms "Safety before dividends," "Safety before profits" and many others were considered, and to Jack Cochrane must go the credit of this slogan which has been used more frequently and by more other organizations than any other, and which without doubt has done much to command public attention to the importance of care and caution in the avoidance of accidents. Very many accidents are caused by a lack of caution which this slogan is well calculated to prevent.

Through the research work of the Federal Bureau of Mines, many of the causes of those disasters which individual caution cannot well anticipate have been determined. Under that leadership, under the banner of "Safety First," the mine accident record has been steadily improved, and in the year 1939 the fatalities in coal mining were reduced to only one-third of those suffered in 1907, when the move toward safety was initiated. These figures have been published before, but a repetition will not be amiss, as it may reach some whose attention had not been reached heretofore, and thus add to the number of those who fully appreciate the real significance of "Safety First."

This composite picture presents a record so good that the great Red Cross Organization passes this field as not needing its aid—a record better than can be shown by any other industry. A record—in an industry which speeded up its production at the same time its accidents were so greatly reduced; a record which, gratifying as it is, is but an inspiration to make the whole industry as accident-free as many separate operations have shown to be possible.

It has been estimated that the cost of accidents amounts to approximately twenty-five cents per ton of production. This means more than one hundred million dollars annually, a considerable part of which would be avoided if all producing companies would exercise the same care and equal the Safety records of the better managed companies, among which an outstanding example is the Union Pacific Coal Company.

Let the slogan "Safety First" be an ever increasing inspiration toward mine safety.

A JOURNAL FOR THE ENTIRE MINING INDUSTRY—PUBLISHED BY THE AMERICAN MINING CONGRESS

MINING CONGRESS JOURNAL

Vol. 26 MAY, 1940 No. 5

Richard J. Lund, Editor

MINING'S STAKE IN THE GREAT LAKES-ST. LAWRENCE PROJECT

ALTHOUGH completely eclipsed recently by the swift moving European war events, vigorous debate over the Great Lakes-St. Lawrence Waterway and Power Project continues.

Aspects of the proposal adversely affecting the coal industry were briefly summarized by Julian D. Conover (see page 21 of this issue) in an address before the Coal Convention just concluded in Cincinnati. Shortly thereafter these remarks were challenged in a *Chicago Daily News* editorial which opened with this somewhat sardonic statement:

"If there remained any doubt of the eventual construction of the St. Lawrence seaway, it should be dispelled by a speech in opposition to it by Julian D. Conover of Washington to the American Mining Congress. Listing reasons why the seaway should not be built, Mr. Conover asserted that the seaway would cut railroad tonnage, destroy the American market for coal in Canada, permit foreign fuels to come into the Middle West, permit the importation of metals and iron ore and eliminate steam-generated electricity by developing hydro-electric power.

"If all these groundless fears were justified, the best that could be said to all the vested interests arrayed as reasons for not building the canal would be: 'Prepare for the worst.' When the only arguments against a project are the interests of those who might have to improve their product, better their service or cut their prices if subjected to a new competition, there can be only one outcome in a healthy civilization."

By such a bold and outright castigation of the coal industry's case in opposing this proposed seaway and power project, with the plain inference that it is up to the industry to supply a better product at lower prices to meet such competition as might develop under the plan, the author of this editorial is displaying a woeful ignorance of current and past developments in the industry. "Custom-made" coals are now being turned out at modern preparation plants to meet constantly more exacting consumer specifications—and certainly the past price trend has not been upward. Today, against the considered judgment of more than half of the bituminous coal tonnage of this country, the government is virtually ready to promulgate and enforce increased prices, which will make it doubly hard for the industry to meet the competition so necessary in the "healthy civilization" mentioned in the editorial.

Justification of the total expenditure of over a billion dollars on the St. Lawrence project has shifted from emphasis on the navigation benefits cited when it was considered initially over a decade ago, to the current admission that the cheap hydroelectric power to be developed—claimed to be a necessity for adequate national defense—is actually the crux of the situation. Involved would be a gigantic New York "TVA," with so-called cheap power based, again, on a wide open public purse, exemption from taxes, and juggled accounting. In our industrial areas, modern steam-generating equipment using American coals is more than a match in cost for hydroelectric power subjected to honest accounting.

Wasteful aspects of the proposed hydroelectric project also include the consideration that the cost of energy transmission by wire for distances of from 50 to 200 miles is more than 2½ times that of moving an equivalent amount of coal over the same distance. It is assumed that such an enormous power development would naturally involve transmission line networks covering such distances; and to the extent that future industries were not located close to the source, this transmission would be highly uneconomical as compared with steam plants located in existing consuming areas.

Involved in the coal industry's case against the project is the welfare of thousands upon thousands of miners supplying coal to Canada, to industrial areas bordering the seaway and lakes, to the railroads, and to the area embraced in the New York zone where newly developed hydroelectric power would be available—coal markets which would be cut off if the project materialized.

In addition to the stake of the coal industry in defeating this proposed project, the mineral industry is also concerned over the welfare of the iron and steel and other metal industries—vital cogs in the nation's industrial life. Statements already made by M. D. Harbaugh, vice president of the Lake Superior Iron Ore Association, show clearly how the jobs of thousands of miners in the great Lake Superior iron mining region, plus the welfare of additional tens of thousands of people in mining communities, would be seriously jeopardized by imports of high grade foreign ore produced by labor at starvation wages judged by American standards. There is the additional threat of greatly increased imports of crude and semi-finished iron and steel products displacing the output of our own mines and plants.

This being the case under present conditions of production from the Lake Superior iron ranges, the threat would be still more serious in the not far distant future, when more and more beneficiation will be required to maintain the shipping grade of ores from the lower grade deposits which will have to be mined as the richer ores are depleted.

The great fleet of vessels now carrying bulk cargoes on the Lakes is admittedly the finest in the world, operated by labor paid in full accordance with high American standards. The continued operation of these vessels would be seriously impaired by the traffic carried by foreign vessels whose crews are paid at less than half the wage rate of the Lake fleet—largely tramp steamers whose smaller draught would permit their plying the 27-foot channel.

These are only certain highlights of the thoroughly justified concern felt by the coal and iron mining industries over the Great Lakes-St. Lawrence Waterway and Power Project, and there will be no let-up in hammering the complete story home to those holding the key to its future. It is heartening to note a report made this past week that a special group in the Department of Commerce which has been making a study of the economics of this project will be disbanded June 1. Observers take this to mean that for the present, at least, the Administration's crusade to foist this unneeded and uneconomic proposal upon the American public has been abandoned.

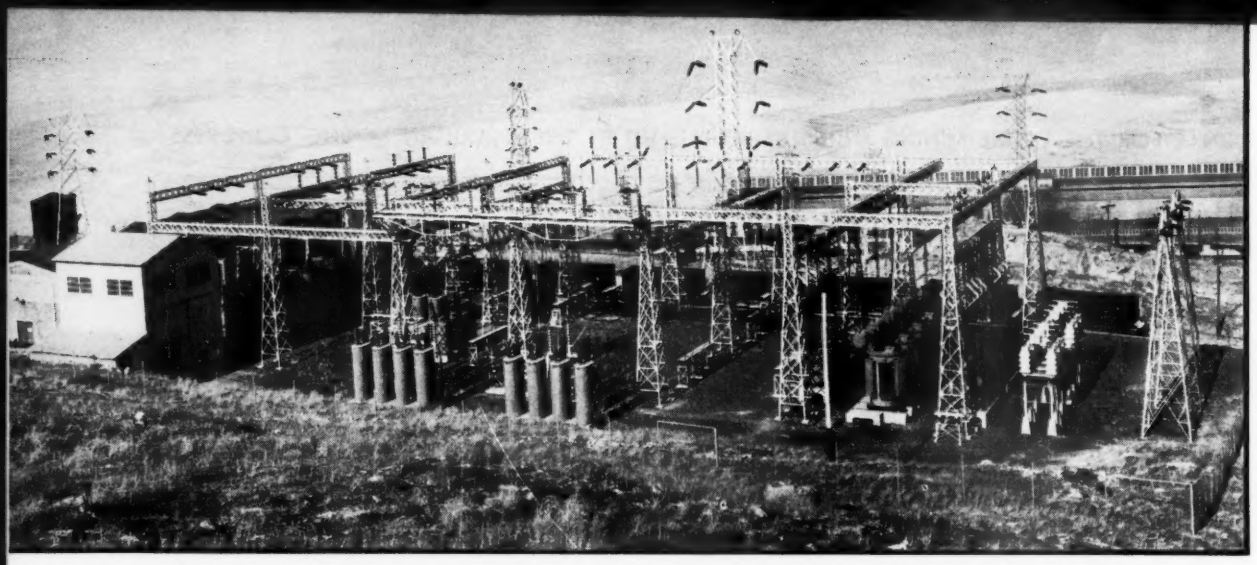


Fig. 1. Exterior view of Central Station rated at 62,000 kva.-120,000/44,000 volts

Role of ELECTRICITY in the UTAH COPPER ENTERPRISE

● ***With Power Consumption at 364 Million KWH Maximum Per Year, Cost Represents Second Largest Item of Classified Direct Operating Expense***

By R. J. CORFIELD
Electrical Engineer
Utah Copper Company

THE methods of mining, purifying, and fabricating of copper are among the oldest of the arts, but, from the very beginning, inefficiencies were so obvious as to indicate continuous improvements in the crude appliances and methods of that early time. As new occurrences of copper ores were discovered and developed, and the metal became more plentiful, competition increased correspondingly, resulting in many notable and some startling betterments in practices, and, as in other progressive industrial pursuits, most advances in process required more motive power.

Power Requirements for Mining, Transporting and Concentrating

Power requirements of the Utah Copper Company may be roughly divided between digging-loading, transportation, and concentration of ore.

The digging and loading operation at the open-cut mine at Bingham is performed by 29 electric shovels. Most are of the standard railway type, and the remainder are the full-revolving model, both using caterpillar traction. All shovels are equipped with 4½-yard dippers.

Transportation of ore from the pit to the mine's assembly yards is performed by a fleet of 61 electric locomotives, each of which weighs approximately 85 tons.

Transportation of ore from the mine's assembly yards to the concentrators is handled by the ore delivery department over an 18-mile, single-track railroad having six passing sidings. For this service, nine mallet-type steam locomotives, weighing approximately 315 tons each, are used. Automatic block signals, together with a centralized traffic-control system, serve to direct all train movements.

Main line assembly yards are located adjacent to the concentrators, and haulage therefrom to the car dumpers at the mills is performed by two electric locomotives weighing approximately 80 tons each.

Two concentrators, known as the Magna and Arthur mills, receive ore from the mine for concentration. Both use practically the same flow-sheet, and in many cases identical equipment. The basic process consists of dumping, crushing, and grinding the ore; thickening the pulp and floating the valuable minerals, and dewatering and loading the concentrate. All equipment used in these various processes is electrically driven and constitutes the major electrical load.

Growth of Power System

Power for the original Utah Copper Company enterprise was generated in a steam plant built for this purpose. This plant had an installed capacity of 8,500 kw. and supplied power to

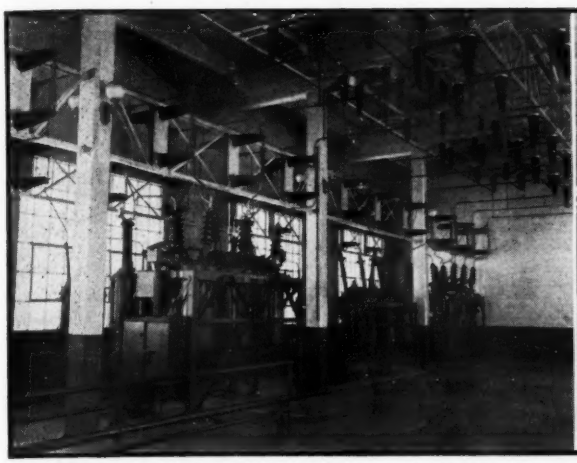


Fig. 2. Interior of Central Station showing main 44,000 volt bus and secondary oil circuit breakers

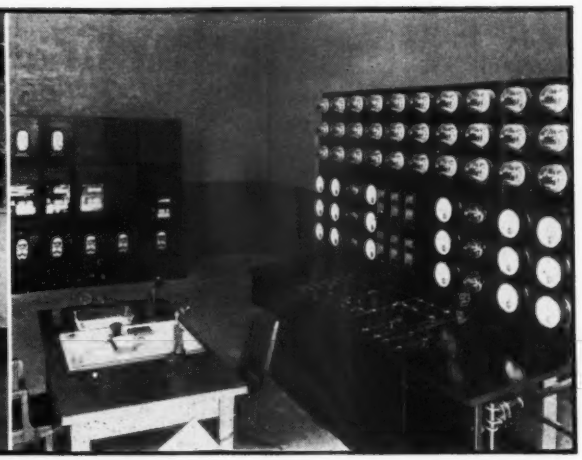


Fig. 3. Control board and metering panels at Central Station

the Magna plant and the Bingham mine. After acquisition of the Boston Consolidated Mining Company's property, which included the Arthur mill, the power problem became one that was, for that period, quite serious, inasmuch as increasingly large tonnages had to be treated to promote maximum economies and revenues. This large contemplated tonnage required much more power than could be economically generated by the original power plant; consequently, this plant was abandoned in favor of purchased hydro-electric power.

It is interesting to note the growth of the primary power system during the 33 years between the use of the original 8,500-kw. plant, then considered adequate, and the present 62,000-kva. power requirement which has been hardly sufficient during high tonnage periods since 1929.

Jump in Secondary System Equally Spectacular

Growth of the secondary system has been equally spectacular and interesting. The original Magna mill substation, equipped to handle 5,250 kva., has been replaced by four substations having a total capacity of 29,850 kva.

The first substation of the Arthur mill had an installed capacity of 3,000 kva., which has been increased to 12,000 kva., and is now supplemented by two substations, the three having a combined capacity of 24,375 kva.

TABLE I—KILOWATT HOUR DISTRIBUTION FOR THE YEAR 1937
BINGHAM MINE

Date	Digging	Transportation	Drilling	Miscellaneous	Total
January	730,882	1,520,000	611,600	126,896	2,989,378
February	773,424	1,472,000	605,500	127,663	2,978,587
March	800,433	1,393,000	563,600	118,027	2,875,060
April	932,025	1,472,000	605,100	136,163	3,145,288
May	899,111	1,441,000	668,400	175,453	3,183,964
June	953,378	1,480,000	683,800	221,527	3,338,705
July	892,916	1,398,000	649,100	217,116	3,157,132
August	981,736	1,423,000	648,100	176,424	3,229,260
September	1,033,371	1,638,000	723,700	203,670	3,598,741
October	930,887	1,636,000	699,700	213,011	3,479,598
November	928,043	1,733,000	692,900	228,641	3,582,584
December	839,961	1,696,000	637,500	231,800	3,387,261
Total	10,696,167	18,302,000	7,789,000	2,158,391	38,945,558
Percent	27.5	47.0	20.0	5.5	100.0

TABLE II—*KILOWATT HOUR DISTRIBUTION FOR THE YEAR 1937
MAGNA AND ARTHUR MILLS COMBINED

Date	Dumping	Crushing	Rolling	Grinding	Thickening & floating	Dewatering & loading	Losses Shops Lights Miscl.	Total
January	47,540	941,432	3,539,664	14,650,566	4,170,964	242,327	2,881,034	26,473,527
February	45,852	906,180	3,287,704	13,848,746	3,828,533	243,524	2,602,394	24,762,933
March	52,124	979,778	4,154,871	15,467,281	4,469,443	237,929	2,946,769	28,308,195
April	49,933	972,782	4,448,053	14,483,862	4,177,919	213,272	3,074,533	27,420,354
May	49,475	1,025,408	4,665,752	14,990,214	4,402,235	226,325	3,031,163	28,390,572
June	48,195	1,032,009	5,401,009	13,743,914	4,340,155	225,032	2,884,448	27,674,762
July	48,850	1,058,790	5,250,669	13,885,692	4,318,886	227,768	2,894,119	27,684,774
August	50,885	1,158,311	5,267,411	13,928,514	4,591,727	231,190	2,596,065	27,824,103
September	51,795	1,143,807	5,726,580	14,295,900	4,479,505	236,660	2,898,423	28,832,670
October	51,839	1,100,267	5,449,911	14,337,202	4,502,340	245,711	3,210,353	28,897,623
November	46,899	952,675	4,803,541	13,137,285	3,898,816	218,961	2,485,812	25,543,989
December	36,410	1,003,878	4,190,867	9,031,996	3,194,255	202,850	2,320,743	19,980,999
Total	579,797	12,275,317	56,186,032	165,801,172	50,374,778	2,751,549	33,825,856	321,794,501
Percent	.2	3.8	17.0	52.0	15.0	1.0	11.0	100.0

* Power used for milling purposes including auxiliaries is 98.66% alternating current and 1.34% direct current.

TABLE III—UTAH COPPER COMPANY—ELECTRICAL DEPARTMENT POWER REPORT FOR THE YEAR ENDING DECEMBER 31, 1937

	January	February	March	April	May	June	July	August	September	October	November	December	Year
Arthur kwh	11,154,077	11,167,418	13,381,603	12,710,964	13,111,855	12,860,954	13,150,500	13,162,865	13,488,186	13,624,954	12,034,151	9,453,795	149,301,322
Magna kwh	15,319,450	13,595,515	14,926,592	14,709,390	15,278,717	14,813,808	14,534,274	14,661,238	15,344,484	15,272,669	13,509,838	10,527,204	172,493,179
Mine kwh	3,355,388	3,033,101	3,384,068	3,367,287	3,433,494	3,336,065	3,501,734	3,583,400	3,506,311	3,898,873	3,854,328	3,914,433	42,168,482
Total	29,828,915	27,796,034	31,692,263	30,787,641	31,824,066	31,010,827	31,186,508	31,407,503	32,338,981	32,796,496	29,398,317	23,895,432	363,962,983
Maximum Demand													
Central Station	66,664	64,455	65,601	65,846	68,300	65,846	67,073	67,891	69,609	67,891	69,281	62,574	....
Magna-Arthur	56,181	56,181	56,483	56,723	58,931	57,762	58,613	59,047	60,793	58,832	59,372	51,282	....
Mine	13,946	14,179	13,522	14,171	14,179	12,311	14,414	14,803	15,543	15,582	17,335	16,595	....
Load Factor													
Central Station	80.618	86.024	87.425	87.051	83.950	87.682	83.775	83.351	86.495	87.037	79.002	68.803	....
Magna-Arthur	84.9	89.1	90.3	90.0	86.8	89.2	85.1	84.9	88.3	88.5	80.1	70.2	....
Mine	43.3	42.7	45.1	61.6	43.6	50.4	43.8	43.6	42.0	45.1	41.4	42.5	....
Tons Milled													
Magna	928,300	876,400	1,013,300	1,012,400	1,081,500	1,104,400	1,095,800	1,170,500	1,156,000	1,065,200	910,500	673,900	12,088,200
Arthur	638,000	740,700	944,200	932,700	1,001,600	1,014,000	1,031,200	1,074,500	1,068,900	1,027,100	885,800	672,900	11,031,600
Total	1,566,300	1,617,100	1,957,500	1,945,100	2,083,100	2,118,400	2,127,000	2,245,000	2,224,900	2,092,300	1,796,300	1,346,800	23,119,800
Kwh per ton													
Magna Milling	15.5625	14.6700	13.9255	12.9040	13.2921	12.5789	12.4014	11.7234	12.5337	13.5884	14.0083	14.5639	13.4347
Arthur Milling	16.9446	14.7243	13.5955	13.7052	12.4029	12.0142	12.0967	11.6322	11.9920	12.6037	12.9156	13.2543	12.8994
Total	19.0442	17.1892	16.1901	15.8283	15.2773	14.6388	14.6622	13.9900	14.5350	15.6749	16.3660	17.7425	15.7425
Average tons daily	50,526	57,753	63,145	64,837	69,437	70,600	70,900	74,830	74,163	67,494	64,154	48,100	....
Hp. demand per average ton	1.319	1.116	1.039	1.016	.985	.933	.946	.907	.939	1.006	1.080	1.301	....

When mining operations were commenced, the "G" level substation had a capacity of 1,950 kva., which has been replaced by two combination shovel and railway substations with a total installed capacity of 14,400 kva.

364 Million KWH Maximum Yearly Consumption

From a power plant originally designed to furnish approximately 75,000,000 kw-hr per year, power consumption has increased to a maximum of 364,000,000 kw-hr per annum, while yearly tonnages have increased from 6½ to 23 million.

Practically all prime movers at the concentrators use alternating current, while at the mine the direct-current haulage system constitutes about half the power load. Power distribution at the mine is shown in Table I, and a composite summary for the two mills is shown in Table II. Statistics covering all departments for 1937, one of the largest production years in the company's history, are shown in Table III. To furnish power for this entire industry, as it is now operated, required the installation of 62,000 kva. in transformer capacity. These transformers are located at a central receiving station adjacent to the Magna mill.

Generating, Transmitting and Transforming the Power

Power received from the Utah Power and Light Company's system is generated in hydro-electric plants in Idaho and Utah, supplemented by two steam-electric plants located in Utah. Transmission lines from the various generating plants terminate at the power company's central receiving and regulating station located about 7½ miles northeast of the Utah Copper Company's concentrators.

Power from the Idaho system is transmitted a distance of 135 miles at 130,000 volts and is received at approximately 120,000 volts. These lines terminate in a common bus, and voltage regulation is maintained by synchronous condensers. From this common bus, two lines, each 7½ miles long, owned and operated by the Utah Copper Company, transmit power to the central receiving station. Here it is transformed from 120,000 volts to 44,000 volts by three transformer banks. Each mill is served by a 25,000-kva. bank and the mine by a 12,000-kva. bank.

Transformer banks, primary oil circuit breakers, and lightning arresters

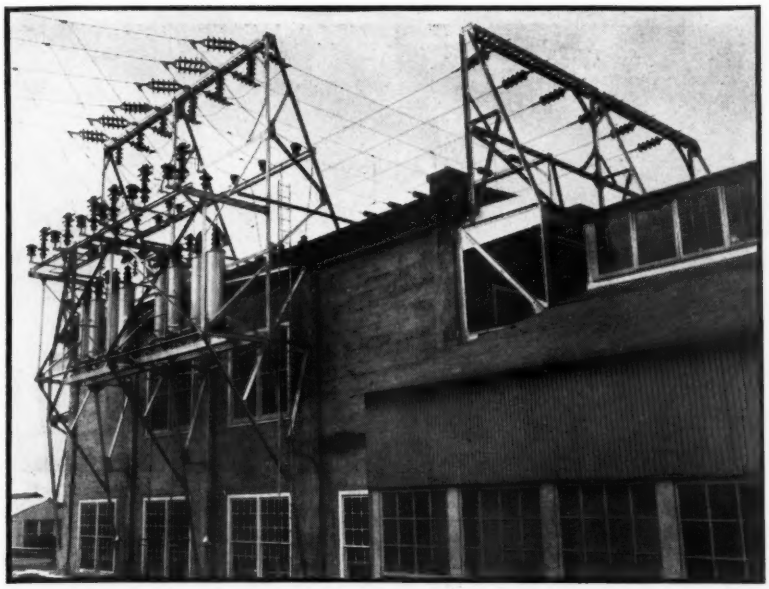


Fig. 4. Exterior of typical substation—44,000/440 volts

are installed outside; while the secondary oil circuit breakers, control and metering equipment are located inside the central receiving station building.

All primary lines and transformer banks are arranged for parallel operation. Secondary feeders are taken through a ring bus provided with sufficient sectionalizing switches to permit maximum flexibility.

Minimizing Delays from Power Interruptions

Continuity of service is a vital necessity in an operation of this kind; therefore, rather elaborate precautions are taken at all stations to provide spare equipment that can be quickly placed in service in an emergency. A well-trained operating crew is on continuous duty at the central station and has direct charge of all switching operations.

Power interruptions are handled with minimum delay to operation by means of a special communicating system between the central station and all substations.

Secondary energy from the central station ring bus is distributed over two-circuit steel-tower lines to the principal substations. Each of the mills and the mine receive power at two substations. At the concentrators the 44,000-volt energy is transformed to 440 volts and distributed through three conductor cables to the various load centers.

At the mine the 44,000-volt energy is both transformed and rectified. Each of the shovel substations has a capacity of 2,4000 kva. divided between two transformer banks, which reduces the 44,000-volt energy to 5,500 volts for transmission to the electric shovels. The railway substations, which are of the full automatic type, have a capacity of 4,800 kva. each. The 44,000-volt energy is transformed to approximately 565 volts, and rectified by means of four 1,000-kw. synchronous converters, to 750 volts direct current for distribution to the trolley system.

The cost of power for the Utah Copper Company enterprise represents the second largest item of classified direct operating expense, and is said to require approximately 40 per cent of the Utah Power and Light Company's widespread hydro-electric output.

The progressive attitude of the management toward electrification has resulted in many economies otherwise unattainable.

—■—

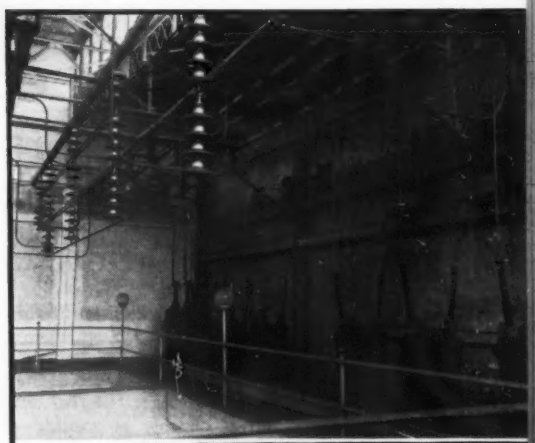
At Lake Maggiore in Italy is a great copper statue of St. Charles Barneo that was already two centuries old when our own famous copper statue of Liberty was dedicated in New York in 1886. According to the Copper and Brass Research Association, the copper sheets on the Italian statue are approximately 1/16 inch thick, whereas Liberty has copper sheets 50 percent thicker, or 3/32 inch.

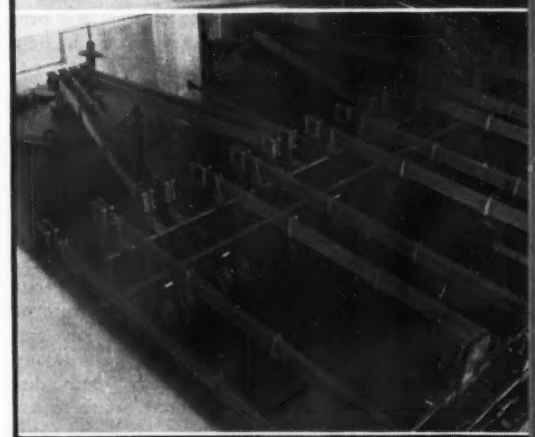
Below—Interior views of typical substation, showing—

Top (Fig. 5): Line oil circuit breakers and 44,000 volt bus

Middle (Fig. 6): Transformers and 440 volt bus

Bottom (Fig. 7): Secondary 440 volt oil circuit breakers





National Legislation Affecting Coal Mining*

By JULIAN D. CONOVER
Secretary
American Mining Congress

THE subject which your Program Committee has asked me to discuss today is not something far removed from the sphere of the operating man—whose job is to get the coal out as safely and as cheaply as possible—but is a matter of very direct and personal interest to every one of us here today. I refer to the legislation enacted by our national Congress which affects coal mining and to the actions of the various boards, bureaus and commissions set up to administer such legislation.

In the last ten years our Federal Government has assumed so many new functions that it has become an extremely important influence in our every-day lives, and in the future of the industry on which our jobs and our livelihood depend. For many years, whenever we have been disgruntled, we have been prone to say "There ought to be a law," and Congress has responded to this sentiment until today we have so many laws on the statute books and so many more being considered that we scarcely realize just how far our American system of freedom of action is being curtailed.

Our whole future and that of our families is to a large extent bound up with the actions of our national government, and we can't afford to take merely a detached and impersonal interest in Washington matters. After all, it's our government, and it's up to each of us to see that our needs and our wishes as citizens are adequately reflected in what that government does. When we go to the polls and vote we are discharging only a small part of our civic obligation. It is even more important that we understand the problems before Congress which affect us and our industry, that we discuss them with our associates, and explain to our representatives in Congress how pending legislation will help us or hurt us. I can assure you that members of the House and Senate welcome advice from the folks at home. There are so many issues constantly coming before them that they cannot possibly understand the merits of each, and you can do them a real service by placing before them the necessary facts so that they can intelligently represent you.

These remarks are explanatory of my subject this morning—National Legislation Affecting Coal Mining. It is such a broad subject that I can only high-light a few major items; and in doing so, it is of course understood that this entire discussion is without regard to politics or partisanship. It is intended solely to present facts and issues from the standpoint of the coal mining industry and those concerned with its welfare.

THE GUFFEY COAL ACT

In any such discussion our minds naturally go first to the Guffey Coal Act of 1937. It is not necessary to tell any coal man what this law is and what it does, but it is worth noting that bituminous coal is the only major producing industry of this country which is thus subjected to rigid Federal control of its prices and the marketing of its product. None of the other natural resource industries are so regulated, although in the case of oil there is some Federal supervision of interstate compacts restricting pro-

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duction and a ban on interstate shipments of oil produced in violation of State conservation laws. It is also worth noting that five years ago a prominent labor leader in discussing the Guffey Act took the position that all other natural resources—anthracite coal, oil, gas, lumber, copper, electric power—must soon follow bituminous coal in assuming a public utility status, and that if this experience should be ineffective, recourse must be had to government ownership and operation.

The present Guffey Act, successor to the ill-starred N. R. A. and the first Guffey Act, both of which were declared unconstitutional, was approved in April, 1937, for a four-year period. Today, a little over three years of its life have run their course, and unless extended by Congress, the Act will automatically expire on April 26, 1941.

Probably no other law in coal's history has been the subject of so much discussion and controversy. At our meeting a year ago a particularly able analysis of its merits and demerits was given by Mr. George B. Harrington, and both before and since that time so much has been said on every conceivable angle of the Guffey Act, and its effect upon coal producers and consumers, that it would scarcely be possible to add any new thoughts at this time. It may be worth while, however, to review briefly the present attitude of the industry and the outlook for the future.

On so complicated a subject there is naturally a wide range of viewpoint, and we are overgeneralizing when we speak simply of "Pros" and "Antis."

Views of Proponents

An important section of the coal industry favors the existing Act, or at least believes that it should be given a thorough trial to see whether it can be made to work. Their feeling is that ever since the over-expansion of World War days, the coal industry has been on the road to ruin as a result of uncoordinated sales policies and destructive price competition, and that some "strong-arm" action on the part of the Federal Government is needed to compel the industry to put its house in order.

Operating men who have reduced their costs through more efficient methods have become discouraged when the sales departments have seemingly kept at least two jumps ahead of them, and have sometimes complained that for every nickel the operating department cuts from its cost, the sales department cuts a dime from the price of the product. Experience over several years during which price demoralization has caused the financial failure of coal companies has led to the saying that "You can bankrupt a coal company, but you can't bankrupt a coal mine"; each reorganized coal mine has returned to the fight with reduced overhead, and has simply added more fuel to the fierce fires of competition.

With excess productive capacity, declining markets and intensified price competition, many producers seem to feel that self-regulation cannot remedy the difficulty, and that only a drastic law with "teeth" in it can save the industry from suicide. They are no doubt basically opposed to bureaucratic regulation, and agree in principle with the view which Mr. Harrington expressed last year—that so far as possible the industry should work out its own destiny under its own initiative, and that no more regulation should be imposed than is absolutely needed to protect against injuries inherent in the nature of the industry, or which public interest demands as a safeguard if the anti-trust laws are to be relaxed. However, many such producers doubt the efficacy of any sort of self-regulation, whether through marketing agencies or otherwise, unless there be powers of enforcement to hold the recalcitrant member in line and prevent unfair price cutting.

Proponents of the Act recognized at the outset the heavy taxes and administrative costs which it would entail, but felt these would be justified if the hoped-for results could be obtained. On the other hand, they undoubtedly agree with the Act's opponents, that to single out the bituminous coal industry, already bearing a disproportionate share of the total tax burden, for a further special tax to pay for its own regulation, is grossly unjust.

Proponents also concede that the Act is an experiment—and a vastly complicated one—but feel that in view of all the time, effort and expense which have been devoted to it, it should be given the trial for which Mr. Ickes pleaded in his address before the National Coal Association last October.

Flaws Indicated by Opponents

Opponents of the present Guffey Act take the position that the theory of price-fixing contained therein ignores the experience of all price-fixing attempts, that it flies in the face of history and is foredoomed to failure. They point out that if attempts to fix prices on simple commodities such as rubber, coffee, wheat, etc., have been rendered futile by the law of supply and demand, this same law will operate even more inexorably to break down the exceedingly complicated and inflexible price structure set up by the Bituminous Coal Division. How, they ask, can one expect that the thousands upon thousands of different prices applying to the various sizes, kinds and qualities of coal from the 13,500 mines of the United States to the 150,000 individual destinations in the United States and Canada, adjusted for differences in freight rates, boat rates and trucking charges between mines and markets, will fare any better than the prices established under the N. R. A.—enforcement of which had broken down long before the law was invalidated. Is not the whole system bound to break down, they ask, leading to demands for still more drastic measures, including restriction and allocation of production, as in Great Britain, and eventually to complete government ownership and operation?

Opponents take the position that no matter how fair and sincere may be the Act's administrators, it is impossible to fix all the prices in this vast schedule in proper relation to one another so that all producers can compete on a fair basis. Even after the nine months of hearings which produced a record of 75,000 pages, the coordination of prices as between producers and districts becomes largely a question of human judgment—and the strenuous protests which have followed recent announcements of proposed prices seem to prove that such judgment is not infallible. Further, with prices fixed separately for each size of coal, it is practically impossible to keep all sizes moving. Unsold sizes, on which the producer is unable to meet competition, will remain on track and quickly force a shut-down of the entire operation. It is pointed out that had fixed prices been in effect during the extreme cold weather of last January producers would have been unable to offer the inducements necessary to dispose of their screenings, and thus could not have produced the tonnage of domestic sizes required to meet the emergency—resulting in acute scarcity, prohibitive prices and thousands of unheated homes.

With its prices fixed by government edict, say the Act's opponents, coal is obviously at a disadvantage in meeting the competition of the "laborless" fuels—oil and gas. Producers of such

fuels will know exactly what prices they must meet, and can invade coal's markets with impunity, while coal will be powerless to make the price concessions needed to retain its customers. Readjustment of the minimum price in time to meet such a situation can scarcely be expected from the ponderous functioning of a bureaucracy which must consider the effects of any such adjustments upon the whole vast system of inter-related prices which it has established.

Opponents further point out that the prospect of a guaranteed minimum price is causing a great influx of new production, particularly in the case of so-called bank or truck and wagon mines. This necessarily means a reduction in working time at established operations, with increased mining costs and reduced earnings of employes.

Basically, say the opponents, the theory of the Act goes directly counter to our whole economic system. By establishing prices for the protection of the less efficient mines, and by guaranteeing a minimum return on sales, the incentive to further scientific improvements in coal mining is stifled, and a check placed upon the American system of continuously improving and modernizing production methods so as to supply consumers with a better product at lower cost.

Marketing Agencies

Those opposed to the Act also take the position that marketing agencies, which were making excellent progress prior to the era of government price regulation, have not been afforded an opportunity to demonstrate their value in meeting coal's problems. They hold that the combination of wage scale stabilization, which came with the N. R. A., and marketing agencies, adequately developed, would permit the industry to work out its own salvation on a natural competitive basis. The viewpoint of these producers has been ably presented by a member of the Congress of the United States, Representative Robert G. Allen of Pennsylvania, who recently urged greater freedom for marketing agencies in the following words:

"The government has criticized the bituminous coal industry for disunity and lack of cooperation among its members. The government itself is more responsible for this condition than any one else. If the government will clarify the anti-trust laws now on the statute books, the coal industry can be brought into harmony by the operators themselves. We all agree that industrial combinations in restraint of trade should be curbed. We will not agree, however, that combinations to increase consumption, lower costs, maintain fair wages, and earn a fair profit should be punished. Indeed they are economically sound and should be fostered. In such cases the government should act as a referee to insure against abuses. This is far more compatible with democratic processes than the role of policemen which Uncle Sam is now playing in the bituminous coal industry. If our government wishes to aid the coal operators in a substantial way, it must first yield back the arbitrary control which it now wields, and it must permit reasonable cooperation within the industry itself. I am convinced that if anyone can stabilize the bituminous industry, it is the operators. They must be permitted to proceed without fear of persecution."

So much for the opposing viewpoints of coal producers. Despite these differences, it is to be expected that both proponents and opponents will recognize that the Guffey Act is today the law of the land, and will do their best to comply with its requirements during the trial period which apparently is close at hand.

Consumers of coal, who were responsible for throwing out the first prices established, have not as yet been heard on the price schedules just announced, but a substantial volume of protests and court actions will probably materialize as these become effective.

Congressional Sentiment

So far as congressional sentiment can be determined there seems to have been a substantial swing since the enactment of the Guffey law in 1937. Strong support exists for a bill proposed by Congressman Allen which would eliminate all tax and price-fixing features of the law, and would provide more liberal treatment for marketing agencies, together with full fact-finding and statistics. Congressman Allen has presented his views on this subject with great vigor, picturing King Coal as the center of a major battle in this country "between free enterprise and regimentation, between industrial freedom and bureaucratic dictatorship."

Action on the Allen Bill is not expected at this session of Congress, in view of the drive for early adjournment. On the other hand, Mr. Allen succeeded on the floor of the House in striking a million dollars from Mr. Ickes' appropriation for the Bituminous Coal Division, and although these funds may be restored in the Senate, the House debate brought forth a significant test of sentiment. There appears to be a definite majority of the House membership now opposed to the principles of the Guffey Act—a majority which would pass the Allen Bill or even a bill to repeal the Guffey Act if an opportunity were afforded. Under these circumstances Secretary Ickes has made no endeavor to extend the life of the Act beyond April, 1941, or to enlarge his powers under the Act; and, barring a decided change in the existing situation, Washington observers generally expect that the Guffey Act will automatically expire on April 26th next.

FEDERAL INSPECTION OF COAL MINES

The tendency of Federal agencies to enter into our every-day problems in the mines is nowhere better illustrated than in the so-called Neely Bill now pending before Congress. Written by the General Solicitor of the Interior Department in cooperation with the United Mine Workers of America, this bill provides for annual inspections of coal mines by the Secretary of the Interior, with additional inspections virtually at the will of the Secretary; the information resulting from such inspections to be presented to Congress as the basis for Federal regulatory legislation.

The underlying principle of the Neely Bill is apparently a broad regulation of mine management in the name of safety. In fact, proponents of the bill have stated publicly that "it will serve to coordinate and render more effective *the regulation and supervision of the coal mining industry.*" The administration of such a measure obviously offers opportunities for grave abuses, political and otherwise, in the arbitrary treatment and harassment of coal producers by a swarm of Federal functionaries.

For many years the mining inspection departments of the coal producing States have performed a splendid work in guarding the safety of the men in the mines. Each State has its own mine inspection laws, adapted to its own conditions of mining, and the mine inspection department of each State has the direct responsibility for requiring safe practices and proper working conditions within its borders.

Mines Bureau's Cooperative Work Effective

The United States Bureau of Mines, on the other hand, was created for the primary purpose of carrying on a broad program of scientific investigations in mine safety and health, and of coop-

erating with State mining departments, mine operators and mine workers in the reduction of accidents. For thirty years it has carried on this work with notable success, and has served as the fountain head of safety research and safety education. Serving on a basis of voluntary cooperation, as provided in its organic act, its work has been a major factor in the achievement of a safety record to which the coal industry and the public may point with pride. The fatality rate from all causes has been reduced nearly two-thirds, and in the fiscal year 1939 not a single major mine disaster occurred in the entire United States. The unfortunate explosions of recent date are not a contradiction of the record established over these thirty years; and the trend toward greater safety in our coal mine operations continues today more strongly than ever.

Neely Bill Would Constitute Safety Setback

The Neely Bill would transform the Bureau of Mines from an authoritative source of safety knowledge and inspiration, recognized and respected as such by State inspection departments and mining men, into a superfluous and unneeded police agency, overlapping and duplicating existing State departments. It would invade the police powers of the States, and would set up a great horde of Federal inspectors acting under instructions from far-away Washington. Worst of all it *would not promote mine safety, nor prevent accidents,* but would tend to destroy the excellent cooperative relations now existing; safety is in major part a matter of teamwork and individual care, and cannot be achieved by strong-arm or blanket methods in the piling up of laws and regulations. That Federal regulation is not a panacea for the elimination of mine disasters is amply demonstrated in the record of coal mine explosions in mines on the public domain lands of the West.

Under these conditions it is not surprising that the Mine Inspectors Institute of America, together with numerous State agencies, joined with the American Mining Congress, the National Coal Association, various State and local coal organizations, and with individual coal men in protesting against the Neely Bill when hearings were held before a Senate committee last summer.

The bill as finally passed by the Senate was amended to eliminate certain objectionable features, but with no change in its basic principle. It is now in the hands of a House sub-committee, which has been studying the question of its constitutionality and has been in communication with governors of the various mining States. From the constitutional standpoint it does seem rather far-fetched that the physical operation of mines, and measures to prevent accidents, should be considered as constituting interstate commerce and hence subject to Federal regulation. Further hearings on the bill have been announced, beginning May 16, and strong pressure is being brought to bear for its enactment.

I trust I have conveyed the thought that the Neely Bill is a bad bill and should not be passed by Congress. It would do harm and would be a definite setback to the cause of mine safety in which we are all so much interested.

STREAM POLLUTION LEGISLATION

Another serious problem to the coal mining industry, which is particularly acute at this time is that of Federal control over stream pollution.

For many years we have recognized the problems created by acid mine drainage and by sludge from coal washeries. Extensive studies have been made by Federal and State agencies and coal companies, to determine what means might be available to clear up the streams in the mining areas, and what the cost of such measures would be. Experiments in the sealing of abandoned workings have had some success locally, and in certain of the active mines it has been possible by careful handling of the drainage to reduce the amount of acid created. By and large, however, the net result of all these studies is the finding that no practicable commercial method exists for handling this problem.

A year ago Mr. J. W. Woomer gave us an able discussion of this subject, and a stream clarification committee of the American Mining Congress' Coal Division was organized, of which Mr. Woomer has accepted the chairmanship. The purpose of this committee is to make available the facts on mine drainage and waste disposal to governmental bodies, wild life organizations, coal men, and others interested in water pollution; also to keep in touch with new developments and further studies, and to cooperate in efforts to work out any possible solution.

The coal mining industry is thoroughly sympathetic with the desire to keep waste products from the streams and to make their waters as pure and clear as possible. Coal men themselves are as much interested in this end as the general public; but they realize, and the general public must realize, that continued employment and payrolls are of first importance; that to eliminate acid from the mine drainage in most cases involves a prohibitive cost, and that to restore the streams to their pristine condition would mean shutting down many operations on which entire communities are dependent.

Laws regulating pollution have been enacted in many of the coal-producing States, dealing with the particular problems encountered within their boundaries. Pennsylvania, West Virginia and Ohio have specifically exempted acid mine water from their laws, on the ground that there is no practical way to eliminate it. It is generally recognized, also, that acid

mine waters are not injurious to health, and that in fact they do much to neutralize deposits of sewage and to counteract the dangers from that source.

"Mandatory" Versus Cooperative Type of Legislation

In the past decade, primarily as the result of a serious pollution problem in the Connecticut River valley, strong agitation arose for a drastic Federal anti-pollution statute, and this has been vigorously pushed by the various wild life organizations. There has been a long controversy between the advocates of a "mandatory" bill providing centralized bureaucratic control over all pollution problems, and those favoring a saner approach through research and studies by the Federal Government, and Federal State cooperation. This whole movement has necessitated careful attention from the mining industry's representatives in Washington, and I will indicate briefly its status today.

Last year the Senate passed a reasonable water pollution measure, providing for scientific studies by the Public Health Service and cooperation with State and local bodies and industries which had pollution problems. In the House, however, supporters of the Izaak Walton League, by resort to a stratagem, inserted the so-called Mundt amendments (named after their author, Congressman Mundt of South Dakota), which completely transformed the bill.

The Mundt amendments provide that no *new source of pollution* shall be permitted to be discharged into any stream *until and unless approved by the Public Health Service;* and provide for action in the Federal courts against any person violating this provision. Note that there is no definition of what constitutes a "new source of pollution." Apparently, however, it would refer to any new coal mine which might be opened, or to any new point of discharge of drainage required in the normal extension of present mine workings, even though draining into a stream which already carries mine waters. Any such "new source of pollution" would have to be submitted to Washington for approval or the mine could not operate. These amendments are open to the same objections as the other "mandatory" bills of the past five years, and would put our mining industry in a straitjacket.

This legislation is now in the hands of a conference committee composed of representatives from both Houses of Congress. Mining men from all parts of the country have advised their Senators and Representatives of their strong opposition to the Mundt amendments, and have urged that they be eliminated. Action by the conferees is expected shortly, and it is not too late to make a forcible expression of your viewpoint.

FOREIGN TRADE AGREEMENTS

The subject of foreign trade agreements, at first thought, appears to be one far removed from the mining of coal. We are likely to think of such agreements as having to do with Belgian laces, French perfumes and Scotch whiskey, and with means for aiding the American farmer and cotton grower. Actually the reciprocal trade agreements recently negotiated by the State Department cut deeply into our own business, and vitally affect the tonnage of coal which we can mine and sell.

Under a recent trade pact with Venezuela, the excise tax on imported fuel oil was cut from 21 to 10½ cents a barrel, thus opening the door to increased imports of Venezuelan crude oil along our entire Atlantic seaboard. Oil from Venezuela has a heavy, asphaltic base and is used mainly for fuel, with the result that these imports enter directly into the normal market for domestic coal. Although a quota on the total imports from Venezuela was imposed, this permits entry of some sixty million barrels annually and thus is of little protective value. Sixty million barrels of oil will displace directly 15,000,000 tons of coal. When we consider that this means loss of employment by 15,000 coal miners, to say nothing of an equal or greater number engaged in transporting and distributing coal and in serving the industry, it is clear that foreign trade agreements are more than a subject of remote or casual interest—they reach right out to the mines and affect the pay checks of every one of us.

The Venezuelan Trade Treaty was negotiated and proclaimed over the protests of both oil and coal producers. It is one of 23 such treaties made by the State Department under authority of the Reciprocal Trade Agreements Act of 1934. It is worth noting that the agreements made under this act in many ways are not reciprocal at all, for any concessions which we make to one country are automatically extended to practically all other countries on the face of the globe, without any reciprocal or compensating benefits from these countries in return.

Trade Treaty Authority Extended

The authority to negotiate these trade agreements was due to expire in June of this year, and the Administration's request to extend that authority occasioned the hottest fight of this session of Congress. In the Senate, particularly, strong forces were aligned to defeat the program or to adopt an amendment by Senator Key Pittman, of Nevada, which would have made all such agreements subject to Senate ratification. Our organization had strongly urged such an amendment upon the Senate Finance Committee, upon whom we urged that the duly elected representatives of the people—the members of the United States Senate—be given an opportunity to pass upon these commitments with foreign nations before they become effective. At that time we went on to say:

"We take issue with the statements of Mr. Grady (Assistant Secretary of State) that 'Senate ratification of trade agreements would be not merely a check on the authority to be exercised by the Executive, but a complete black-out' and that 'ratification is tantamount to repeal.' We cannot agree with the implication in these statements that only the appointed officials of the trade-agreements organization have the clear vision, intelligence and incorruptibility to handle our entanglements with foreign countries, and that elected Members of Congress, responsible directly to the people, are incompetent to discharge their duty to the Nation when confronted with sectional issues. We submit that a trade agreement which cannot obtain ratification by such elected representatives can scarcely be in the public interest.

"We do not believe in the existence of permanent 'emergencies' which justify continued deviation from our basic form of Government. But regardless of the legal questions involved, the interests of American industry and labor call for some check upon misdirected zeal in the negotiation of these compacts. The requirement of Senate ratification would make the trade-agreements organization more conscious of its obligation to adhere to its stated policies, to be careful and accurate in its findings of fact, and to safeguard domestic industries against injury.

"We ask in all earnestness, is there any reason why our American citizens should not have the same privilege enjoyed by the people of other nations, of scrutinizing the contracts made in their behalf and communicating their views to their representatives in the Senate, who may then approve or disapprove these pacts? Are the members of our Senate any less competent to pass on treaties than the legislative bodies of other countries, the great majority of which subject their agreements to ratification?

"We plead for a resumption by the Senate of its proper function in the conduct of our foreign affairs by reviewing the acts of executive agencies which may mean life or death to important segments of our economic life."

The Pittman amendment requiring

Senate ratification was defeated by the narrow margin of 44 to 41, with the majority of the senators from coal-producing States unfortunately failing to support the western senators in their battle to restrain the State Department. Also lost was an amendment by Senator McCarran, of Nevada, to prohibit further tampering by the State Department with the import excise taxes on coal and other commodities, which are distinct in character from ordinary tariff duties.

The net result was extension of the trade agreements program for another three years to June, 1942. During that time, further agreements may be negotiated which would seriously affect us, and it will behoove all who are interested in coal's welfare to exercise continued vigilance against such further trading away of our markets.

ST. LAWRENCE WATERWAY AND POWER PROJECT

To coal's great inland markets, the natural barriers of distance and railway charges are of even greater importance than tariff protection in preventing invasion of foreign fuels. Today, however, we are faced with the threat of a deep-sea waterway, from the Atlantic through the St. Lawrence River and the Great Lakes, which would destroy the protection of these natural barriers.

The present project is an old acquaintance in new dress. Debated for many years, a treaty with Canada for construction of the waterway was rejected by the Senate in 1934, but two years ago the proposal was revived by President Roosevelt. This time there is less emphasis on the alleged savings to the western farmer in shipping wheat to Europe, and far more emphasis on the huge power developments along our international border. We have discussed this subject on a good many occasions, and a particularly eloquent analysis was made by Mr. R. L. Ireland at a recent meeting of our Coal Division. In addition to the enormous costs to our Federal government, which we would all have to pay in taxes; to the destructive effect upon our highly efficient Great Lakes fleet and its crews of well-paid American seamen, and the fact that the outlet to this whole waterway is owned by another country, I will mention only a few aspects of this proposal which directly affect the coal industry.

Harmful Effects to Coal Industry

1st—It would destroy the market for American coal, bituminous and anthracite, in Canada, amounting in normal times to some 15,000,000 tons. This market would be preëmpted by foreign coals and fuel oil.

2nd—It would permit these foreign fuels access to our Great Lakes ports, in the heart of our inland coal market, where they might easily displace another 20,000,000 tons or more of our product.

3rd—To the extent that the waterway was successful, it would divert tonnage from our railroads, with corresponding loss in consumption of locomotive fuel.

4th—Imports of iron ore, finished iron and steel products, and other raw and fabricated materials from countries of low-living standards would tend to disrupt the integrated economic life of the entire Great Lakes basin. The loss in coal tonnage from the decrease in industrial activity is difficult to appraise, but would undoubtedly be a serious blow to our industry.

5th—The hydro-electric power developments, producing vast quantities of electric energy under government subsidy, would either displace present steam generating capacity or would preëmpt the coal market that would otherwise be created by expanding power needs. Again a quantitive appraisal is difficult, though figures of from 5,000,000 to 35,000,000 tons of coal per year have been cited.

The urge for the St. Lawrence project today undoubtedly comes in large part from the economic planners who are so deeply interested in hydro-electric power. In the words of the Niagara Frontier Planning Board, "The truth of the matter is that the present vociferous proponents of this seaway are not really interested in the seaway project at all or in its effect upon the railroads, lake transportation, or American industry. They are interested in POWER, spelt with the capitals T V A."

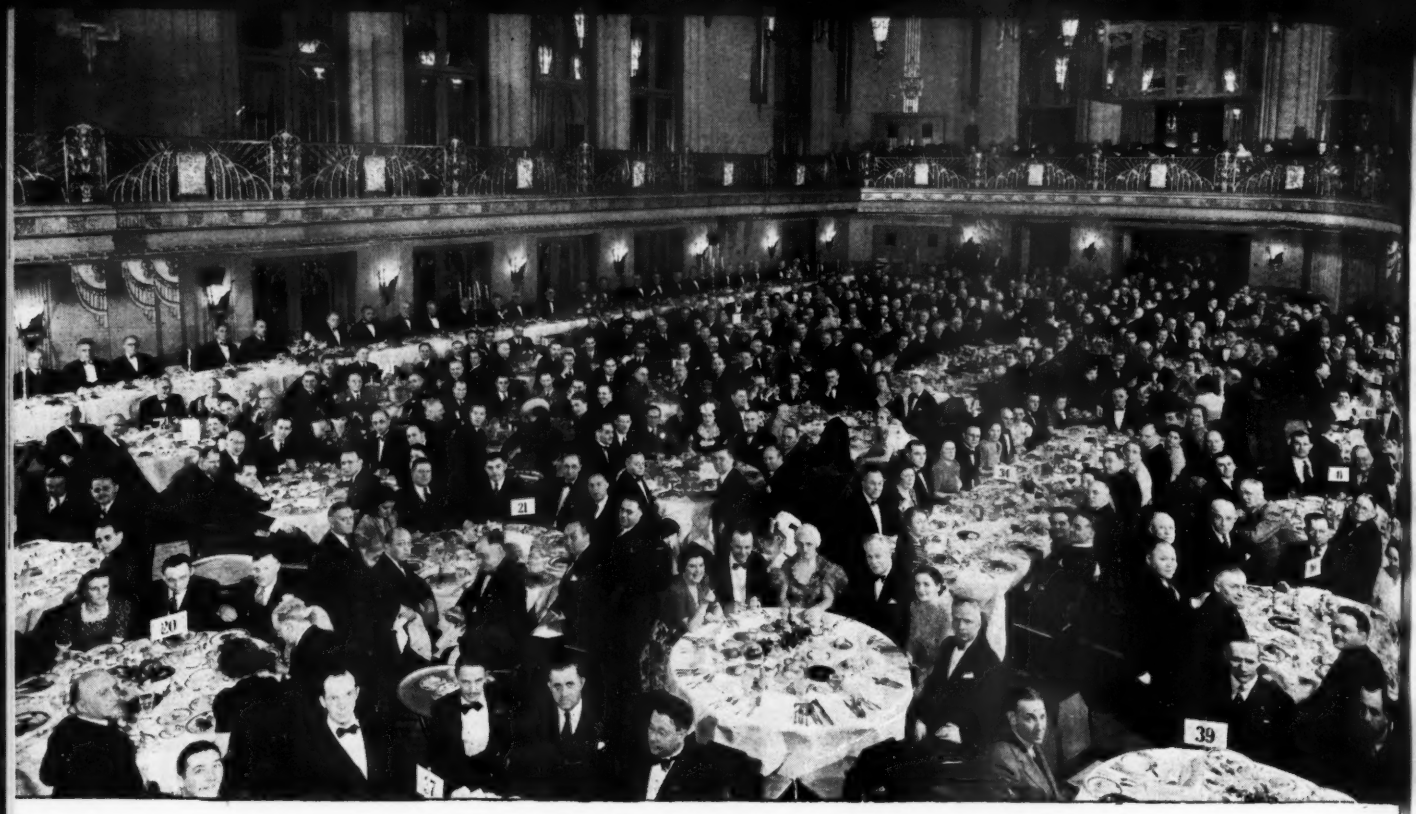
What all this means to coal is readily appreciated when it is pointed out that a displacement of 50,000,000 tons annually would take $100,000,00 from the gross returns to the industry, of which fully $60,000,000 constitutes wages paid to labor. It would likewise take about $110,000,000 from railroad revenues, of which approximately $45,000,000 represents wages to labor.

Recently a new treaty was submitted to Canada by our State Department and is awaiting only the signature of the Canadian government before it will be submitted to the United States Senate for ratification. Press comment has suggested that the present liberal government of Canada under MacKenzie King may approve the treaty even though we know there is disaffection toward it, particularly in the Province of Quebec. It is to be hoped that our Senate in the present session will not be called upon to approve this treaty, but here again eternal vigilance is necessary.

SOCIAL SECURITY, TAX AND LABOR MEASURES

We have discussed the Guffey Act, Federal Mine Inspection, Stream Pollution legislation, Foreign Trade Agreements and the St. Lawrence project

(*Continued on page 58*)



An overflow crowd filled the Netherland Plaza's Hall of Mirrors for the festive Annual Banquet

Past Successes Eclipsed at Cincinnati Coal Show

● ***Seventeenth Annual Coal Convention and Exposition of the American Mining Congress Tops All Previous Attendance Records and Sets New High in Contributing to Industry's Advance***

THE greatest parade ever staged by King Coal! That's how coal men throughout the country are characterizing the 17th Annual Coal Convention and Exposition of the American Mining Congress, held in Cincinnati the week of April 29-May 3. All previous attendance records were shattered as crowds started pouring into Music Hall Monday morning, and daily registration figures kept mounting until a grand total of 5,066 was reached when the curtain was rung down on the show Friday noon. Making up the total were 2,782 coal mine operators, 1,930 manufacturers' representatives, and 354 ladies and guests. And from all quarters came comments on the high quality of the crowd—on their keen enthusiasm in studying exhibits, and in hearing and discussing the excellent addresses presented on the convention floor. All in all, this year's Coal Show proved more conclusively than ever its position as the ace event of the coal-mining year, and plans have already been announced to hold the 1941 meeting at Cincinnati the week of April 28-May 2.

All past attendance records were eclipsed by the 1940 Coal Show, which topped by a substantial margin even the previous high attendance in 1937.

Contributing in no small measure to this outstanding success were Harry M. Moses, National Chairman of the Program Committee, and the 103 operating men working with him. Similarly, the 139 members of the Committee on Arrangements, under the leadership of E. M. Douthat as General Chairman, share honors in this achievement. A vote of thanks is due all these men for their devoted efforts toward such a worthy goal.

Progress in Coal Mining and Preparation, and Outstanding Safety and Economic Problems Reviewed by Speakers

The convention sessions were formally opened Monday morning at 10 o'clock by Julian D. Conover, Secretary of the American Mining Congress. After extending a cordial welcome, Mr. Conover emphasized the importance of these annual meetings which have become a tradition in the coal industry. He said that "for the past seventeen years the best brains of the coal mining industry have gathered in Cincinnati to review the progress of the industry and try to improve our mining methods and equipment so we can keep Old King Coal on his throne." He said that perhaps the best evidence of the value of these meetings to the coal industry is found in the type of men who are willing to undertake responsibility for developing them, and went on by paying tribute to the committee members who have given unsparingly of their time and energy to make the convention a success.

He then introduced leaders in the industry who have been at the helm in promoting activities at this year's meeting.

Program Committee Chairman Harry M. Moses, president of the H. C. Frick Coke Company, addressed the group as follows:

"Welcome to this, your seventeeth renewal of the greatest convocation of industrial heads and the greatest equipment show that any industry in the world extends to its members.

"I have enjoyed throughout the year an association with your "hired help"—your Secretary, your Engineer, your Editor, your Safety Man and many others. You can be proud of the personnel of The American Mining Congress in the Coal Division as I have been, and I desire to take this opportunity for the public expression of my personal gratitude and regard for the entire staff. They have made the intricate and arduous job of arranging this program appear to be a simple pleasure.

"I desire, also, to extend this expression of appreciation to the members of my committee, the various State and District Chairmen who have given so unsparingly of their time and ability to the creation of your program; to the host of generous, capable people who have accepted the extra-curricular task of preparing with painstaking care these many interesting and educational presentations which you will presently, in this session and in the other sessions to follow, hear and see; to the great number of other people who have signified their willingness to discuss these papers upon presentation; to the generosity and cooperation of the equipment manufacturers who make this great show possible; to the large group of committeemen in the various activities of the Congress who assemble from time to time throughout the year for the purpose of reporting on their activities and promoting interest in this meeting; and, finally, by heartfelt gratitude to the owners, operators, and employes of the coal mining industry who by their attendance here make the work which has been done pale into insignificance when compared to the results obtained.

"I repeat our welcome to you and sincerely hope that each of you will leave here with some new knowledge acquired, some old associations renewed, some new friends and associates acquired, and, without reservation or equivocation, and in the language that every coal miner understands, 'a helluva good time.' "

E. M. Douthat, vice president of the Sinclair Coal Company, and General Chairman of the Arrangements Committee, had expected to welcome delegates at the opening session, but wired that unavoidable events had transpired which precluded his coming to the convention until Wednesday.

Frank E. Mueller, vice president of the Roberts & Schaefer Company, and Chairman of the Manufacturers Division of The American Mining Congress, welcomed the crowd with these words:

"I give you a hearty welcome in behalf of the Manufacturers Division.

"The progress being made in mining and mine equipment has been brought before you year after year in these fine conventions and expositions. Changing conditions in the industry have made this progress necessary.

"The manufacturers, sitting in and cooperating with the various committees of the Coal Division, have been in touch with the operators and their problems, and have thereby been in a better position to help design and build equipment to produce better products at lower costs to meet the stiff competition of other fuels. More and more will this cooperation take place.

"This and other conventions are due to the efforts put forth by the American Mining Congress, the operators and the manufacturers, and we wish to express our thanks for your valuable assistance.

"The manufacturers will continue their work for the betterment of the industry—rest assured we will give you all we have to make the industry more profitable."

A rousing welcoming talk was given by R. L. Ireland, Jr., president of the Hanna Coal Company and Chairman of the Coal Division of The American Mining Congress, in the following words:

"It is a great pleasure to see so many faces here. I had to be up here, but I almost didn't come when I saw all the exhibits on the floor that I wanted to look at.

"Now, the fact that *you* didn't have to come but *did* come shows that you really take this Mining Congress seriously.

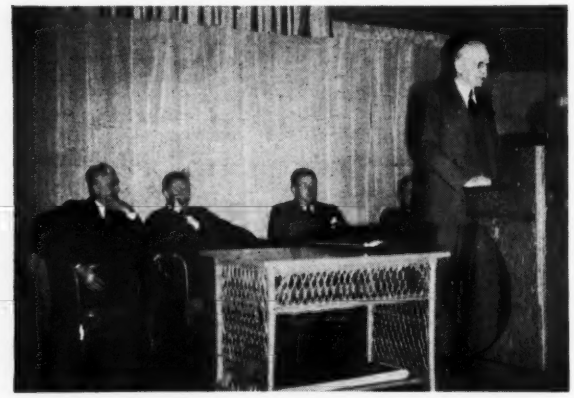
"I missed the meeting last year because I was in New York on wage scale business, and I think possibly in the last ten years I have missed one or two others, for equally serious business. But this is one week that is always marked off on my calendar for these reasons: First, I get a chance to meet and discuss mutual problems with other operators from other districts whom I can't see in between times. Second, it is an opportunity to talk to the manufacturers who are just as instrumental in advancing our coal industry as we are ourselves—without them we would not get anywhere. And lastly, it is the community of interest through which the operators and manufacturers, working together, and I say 'working' advisedly, be it day or night, that is the spark-plug of advancement.

"Now, don't let's kid ourselves. The bituminous coal industry today, in spite of its recent progress is still one of the backward industries of the United States. We've got a long way to go in retooling our industry to get on a par with other industries. We are a long way behind the light-house, and we've got a long way to go; but this annual convention here, in my humble judgment, will go further toward putting the bituminous coal industry on its feet and in its proper place in the sun than any other individual or collective means."

Howard I. Young, President of the American Mining Congress, who was unable to be present at the opening session, wired his greetings and congratulated the delegates and the manufacturers "upon the very valuable week which has been arranged by your able and untiring Program and Arrangements Committees." He pointed out that "in each of the past seventeen years the coal mining industry has derived genuine inspiration and encouragement in overcoming obstacles to its progress from these annual meetings," and concluded with the be-

Crowds swarmed into Music Hall Monday morning, taxing registration facilities to the limit

lief that "this year's Coal Show will be one of the most memorable in our history." Mr. Young was present for the last two days of the meeting.



J. F. Callbreath, Secretary-Emeritus of the American Mining Congress, addressing the opening session Monday morning. Seated, left to right: Ernest Agee, R. L. Ireland, Jr., Harry Moses, and Frank Mueller

J. F. Callbreath, for almost 40 years Secretary of the American Mining Congress, and now Secretary-Emeritus, after greeting the crowd and paying tribute to his successor, made the following remarks:

"In 1907 I was sent by a few straggling people at Denver to Washington to see if it were not possible to bring about some cooperation between the Federal Government and the mining industry.

"In Washington we undertook to work to two principles: We undertook to bring about safety and efficiency in mining operations. In the efficiency end, I do not believe that any industry, ever, in so short a space of time, has so improved its technique; so developed the machinery for economic mining as the coal industry. And I think we have a right to feel proud, as coal operators, in the fact that the coal industry is the fundamental, basic industry of the nation, and without its success the industry of the nation would shrink and fail. Cheap power is the one thing that is necessary to bring about the success of any industrial nation.

"But as you gentlemen have increased your efficiency in the mining industry on the one hand, on the other hand you have found yourselves facing all kinds of interferences and obstacles on the part of government—new reports to be made, and constantly increasing taxes which are a burden on any industry; and there is much to be done in bringing about such conditions as will enable the coal industry to function on its own.

"In the field of safety, notwithstanding some recent disasters, we have made a wonderful accomplishment. In the year 1939 coal mine fatalities amounted to only one-third of those in 1907, when the work looking to safety was just getting under way—a remarkable result in an industry which we all realize is hazardous. I feel all of us can congratulate ourselves on these vastly improved efforts which have been made to bring about safety in mining operations. Our original plan to develop safety and efficiency has been very, very successfully carried out.

"We must go further—we must work out our relations with government so as to permit the coal industry to carry on and further improve itself and give the nation the cheap fuel upon which its future must rest. Notwithstanding the fact that we have fuels in other lines, we must remember that coal is cheap fuel, and we have the responsibility of the nation's future industry in our hands, which can only be met by greater efficiency in coal operations."

DIGEST OF PAPERS

A digest of each of the papers presented during the four-day session, classified into various branches of mine operation, follows.

Face Preparation

Coordination of Face Preparation with Mechanical Loading, by **J. W. Anstead**, Templeton Coal Co., Sullivan, Ind.

Mechanical loading, as practiced in mines today, has brought forth many perplexing problems in efficient and economical operation. These problems must be attacked from many different angles and one of the main considerations is face preparation, after which the problem of loading the coal requires extensive study. These two phases of mining must be so coordinated that there will be a minimum of congestion and confusion and at the same time work must be concentrated as much as possible.

A careful study of face preparation will bring out the following points:

1. The possibility of greatly reducing explosive cost per ton by considering various drilling patterns.
2. Placing responsibility of proper shooting on section foremen.
3. Educating face preparation men in proper shooting.
4. Experimenting to determine most adaptable form of explosive to obtain coarse coal yield with minimum amount of powder.
5. The benefits of cushion shooting.
6. Encouraging suggestions from face preparation men will pay dividends.
7. Controlled shooting.
8. Equipping all face preparation men with proper tools.

A careful study of placing shots and other factors in shooting should be carried on by explaining in detail the purpose of the study to the face bosses and all men engaged in face preparation. This explanation should emphasize how better shooting, increased loading machine efficiency, and increased coarse coal yield all contribute to larger sales and working time. All men engaged in this preparation work should be encouraged to give suggestions, and their ideas should be given every consideration, thereby stimulating interest in the work.

The following points are of prime importance in coordination: (1) Night preparation to relieve congestion and confusion; (2) consideration of shuttle or transfer car loading; (3) maintenance; (4) track, to minimize distance of car change and the elimination of derailments; (5) timbering; and (6) concentration without disrupting working cycle.

Certain Phases of Face Preparation, by **J. T. Parker**, Supt., Inland Steel Co., Wheelwright, Ky.

The cutting operation at our mine is carried on entirely by short-wall machines. At the present time we have in service 37 machines, and included among these are machines of the principal manufacturers of this type of equipment. During the past 10 years, which have been years of expansion for us, we have added a substantial number of machines. At the beginning of this period of expansion the question of the type of machine best suited to our operation was carefully considered. Various approaches to the question were explored. The question of cutting rate, production per machine, and the natural conditions under which the machines were to work were considered. Finally it was decided that the governing factor in our decision must be the seam conditions in our mine.

Several years ago, after an unsatisfactory experience with the type of bit in use at that time, we decided to change to a roller type bit-sharpening machine, and at the same time we ran a test of a hardfacing method that appeared to offer a more satisfactory bit at a substantial saving. After a convincing demonstration had been carried on, we adopted this method, which utilized "Borod" as the hard-facing metal, and have continuously used it since that time.

Borod seems to possess special properties which contribute to a good cutting edge. It approaches the diamond in hardness with the Borium particles acting as the cutting media, and at the same time can be applied with an acetylene torch by an employe of average intelligence after very little instruction.

During the first 12 months of our experience with Borod, we pointed 278,561 bits at a cost of .00604 cent per point, or a total expenditure of $1,682.50. Therefore in the first 12-month period following the adoption of hard-facing, we saved the difference between $2,774.12 and $1,682.50, or $1,091.62 in labor and material, which is in addition to the saving in the purchase of new bits amounting to $120.40, making a total saving for the year of $1,212.02. We must not, however, lose sight of the fact that while there was the actual saving of $1,212.02 in labor and material in the 12-month period after we started the hard-facing, that we also produced 259,333 tons more coal. On a tonnage basis the savings amounts to $2,143.43.

In our application of Borod we use a style No. 9900 Airco type D. B. oxygen acetylene welding torch with a style No. 89 No. 5 tip. We use welding rod size ⅛ in. by 14 in. and tip on an average of 260 bits per rod.

In my opening remarks I mentioned the fact that at times a fundamentally sound idea is lost track of for one reason or another. I think one of these ideas is a plan for standard timbering of the working face. While we ordinarily think of a standard plan of timbering as a program of the safety department, it also makes, I believe, a very definite contribution to the efficiency of the coal loader and to employer-employe relations.

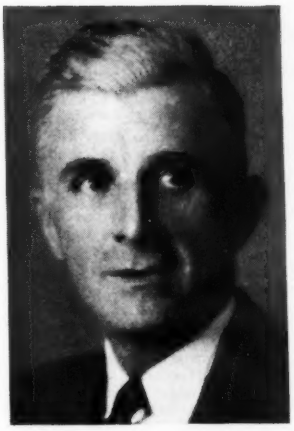
At our plant we have in effect one standard plan of timbering for slate roof and another for sand rock. It is impractical and uneconomical to insist on as many timbers being set under a perfectly sound roof as under a dangerous slate condition.

The subject of timbering can hardly be dropped without some reference to safety. We believe at our plant that a standard plan of face timbering promotes safety. Although there may be, under this plan, many timbers set under solid roof, it can also be said that it assures to a large extent the timbering of roof that is dangerous or becomes dangerous unknown to the miner. In other words, we feel that a standard timber plan eliminates guesswork in a situation where a bad guess may result in a serious accident.

Late in 1938, following a series of very serious accidents from falls of roof, much thought was given toward finding a method of safety timbering that would go farther toward the prevention of this type of accident than the one in use. For some time we, like a large number of other companies, had been using steel roof jacks for roof support at the face on mechanical sections. It was natural when we began to cast around for an improved method of safety timbering for the whole mine that our thoughts should turn in this direction. Deciding that the steel post was the answer to our question, the supervisory personnel of the mine went underground to prove or disprove, so far as possible, their idea. After experimenting in various ways, the decision was arrived at to purchase these jacks for all working places. At the time we were not convinced that they could be successfully used on pillars due to weight, and within a short time we found our doubts to be well founded and removed them from all pillar work and returned to the use of the regular wood timber.

The jacks were eagerly accepted by the loaders, as they recognized that in addition to their superiority as a safety post they also were a definite contribution to efficiency. The steel post could be set in 30 to 40 seconds while the length of time required to set a wood timber varied from a minute to five or more minutes, depending on the condition of the place.

Time after time since the adoption of these timbers they have demonstrated their value. When they were first installed, careful thought was given as to the best way of removing them. It was decided that the safest way to do this was to loosen the timber slowly, and after it became free to the point that it would just stand, to wait a few seconds to give any loose roof a chance to settle. This has since proven a safe and practical way to do a job that had heretofore resulted in several serious accidents at our plant.



ERNEST B. AGEE
Chairman of the Session on Face Preparation

The Floating Shot—As Applied to the Use of Permissible Explosives in Blasting Down Coal, by **James M. Godwin**, Chf. Mine Inspector, Pocahontas Land Corp., Bluefield, W. Va.

To reduce the shattering and pulverizing effect of the permissible explosive as ordinarily used, many mines have adopted the practice of providing an air space or air cushion at the outer end of the charge to absorb some of the excess pressure of the initial explosion and delay the time of reaching the peak explosive pressure.

Similarly the advantages of the air cushion are enhanced and the shattering and pulverizing effect of the permissible explosive further reduced by providing an air cushion at each end of the charge, and having the hole of such size, and supporting the charge in the hole in such manner, that the charge is entirely surrounded by air and is practically floating in air, hence the term "Floating Shot."

Experiment has demonstrated that still further advantage is obtained by placing the detonator at the end of the charge facing the bottom of the hole, on the theory that the explosive action will be progressive and that the peak pressure of the explosion will occur well out over the kerf, thus taking advantage of same and requiring less explosive to break down the coal.

Success with the Floating Shot requires a careful study of the coal seam being mined and partings to be eliminated, coupled with experiments to determine the proper placing of the cut; number and spacing of holes; grade and quantity of permissible explosive to be used; order of shooting holes; careful adherence to detail, and also thoroughness in cutting, cleaning of cuts and drilling necessary to the success of any method of shooting.

Advantages of the "Floating Shot" as compared with the tightly tamped charge of permissible explosive:

1. Is just as safe and usually safer, due to more care in tamping.
2. Holes are loaded just as quickly.
3. Is a better balanced shot, with greater springing area and spreading power and a heaving out effect.
4. Requires less explosive.
5. Does not shatter or pulverize the coal.
6. Produces a greater proportion of larger sizes of firmer structure than can be handled with a minimum of degradation.
7. Partings and other foreign matter, when present, are not shattered or pulverized and can be more readily removed.
8. Less damage to bad roof.
9. Overshooting is not as damaging to coal or roof.

The Floating Shot, when used in accordance with the above procedure, has been permitted by the West Virginia Department of Mines. In mines where used with the above features in mind, results have been most satisfactory.

Applied Science

Education Training in the Coal Industry, by **H. R. Wheeler**, Industrial Relations Manager, Pittsburgh Coal Co., Pittsburgh, Pa.

During the past 10 years the coal industry has progressed more technologically than in any other period in its history. Mechanized mining and preparation have advanced at an accelerated rate, and management methods, which are an integral part of mechanized manufacturing industries, have been assimilated by mining concurrently with the installation of machinery. Because of the increasing complexities of the industry, and the urgent necessity for continued technological and managerial advance, new responsibilities are being placed on the personnel of mining organizations. The situation requires the development of new skills, more discriminating knowledge of operating technique, and the attainment of a higher level of overall results. Fulfillment of these requirements is dependent to a large degree on an appreciation of the situation and, secondly, on the development of men to meet it.

There is probably no single way in which the operators can cooperate more with technical schools than by encouraging young men with mining background to attend college, and by placing students in the mines during summer vacations. It is decidedly advantageous to the industry if enrollment in mining schools is drawn from miners and sons of mining men, because these men have an appreciation of the nature of the industry and definite objectives regarding their life's work before entering college. Summer employment after the student's freshman year is particularly important for the men who have had no underground experience. It gives them an opportunity to test their interest in mining and aptitude for the industry. It enables them to clarify their objectives early in their educational period and to specialize in subjects which are particularly useful in coal mining.

The Pittsburgh Coal Company already has taken direct action to increase enrollment in mining schools. Two scholarships annually have been established at the Pennsylvania State College for employes of the company who have had at least one year of underground experience,

H. L. RICHARDSON
Chairman of the Session on Applied Science

and funds have been made available for loans to a few men who wish to acquire an engineering education. In all cases the scholarships and loans are not sufficient to cover all of a student's expenses; it is necessary for him to supplement his income by working during vacation periods. The policy of supplying only a portion of the cost is based on the promise that the student will accomplish the best results if he is required to bear a portion of his expenses.

In addition to men selected for scholarships and student loans, other young engineers are being inducted into the organization. Last spring a number of graduates and undergraduates were employed for permanent positions and for the summer vacation period. Results have been so satisfactory that plans are being made to continue the program on a larger scale at the end of the present school term.

In instituting an educational program, it is essential that provisions be made to develop men in the organization who have risen from the ranks. Mining men know that coal is an industry first of men, and secondly of materials and technology. Supervisors and executives who have risen from the ranks have done so because of qualities of leadership, inherent energy and intelligence, because of their knowledge of men and management rather than because of exceptional technical knowledge or formal education. Men of superior native ability will continue to appear in every organization, and provision should be made to assist them in developing themselves. In the case of the Pittsburgh Coal Company, a number of activities have been undertaken to meet this situation.

In recent months, all superintendents, foremen, and fire bosses have participated in a special course directed toward the development of constructive ideas, safety, qualities which make for good supervision, and of understanding of their associates and their employes. Training of this nature will be continued from time to time, probably by the conference method, under the leadership of men selected from the supervisory force and trained for the work by State agencies.

When operating men meet, equipment usually constitutes a major part of their conversation. The relative merit, adaptability, and performance of the products of the machinery manufacturers are discussed at great length. Although the success or failure of a mechanization project is dependent to a very large degree on the man power involved, discriminating attention to the development of personnel qualified to meet changing technology oftentimes does not receive the same attention given to the physical elements of the undertaking. The man who builds the best mousetrap may bring the world to his door, but there is no value in his brainchild if the purchaser does not know how to place the bait. It follows that realization of maximum results from a mechanization program is dependent upon simultaneous consideration of men and equipment. Much probably can be accomplished by the adoption of principles which have made for progress in industries where mechanization is of long standing.

Training of men, whether laborers, supervisors, or college students, is not a welfare undertaking. It should not be approached from a paternalistic or altruistic standpoint. It is a practical business venture, tempered with a liberal measure of human understanding, with increased profits as its objective. Educators, educational institutions, various agencies, both governmental and private, and practical men who have an appreciation of the possibilities are eager to help. In many cases cooperation with these men on the part of an operator may determine his ability to survive in the industry. Certainly it will be those operators with outstanding personnel, with a positive attitude towards the situation, who will enjoy the greater degree of security. With security and increased earnings, corollaries of skilled man power, employes, whether supervisors or laborers, can administer their own welfare in accordance with their own desires.

Underground Distribution of Power, by **K. L. Konnerth**, Elec. Engr., H. C. Frick Coke Co., Uniontown, Pa.

The number of different methods of interconnecting apparatus for the distribution of power is almost unlimited, each arrangement having its own particular application. A form of connection might be desirable for one class of service and undesirable in another, so each arrangement must be selected to meet the particular needs of the case under consideration. There are, however, certain fundamental requirements which each successful distribution arrangement should meet, some of the most important of which may be enumerated as follows:

(a) No arrangement should be countenanced which in any way subjects the plant force, or others, to undue hazard. "Safety first" should be the guiding motive of every layout. This point is of particular importance in a coal mine because of the impossibility in most cases to isolate the power line by elevation due to the restricted space available. In addition to the shock hazard to men is the danger of gas or coal-dust ignition resultant from electrical causes.

(b) It should be flexible. This is obvious because in no other industrial power system are the load center and nature of load subject to such continuous change as in a mine.

(c) It should be designed to insure a degree of continuity of service commensurate with the class of load served. With such factors to consider as mine drainage, ventilation, financial loss due to interruption in production, etc., this requirement must not be overlooked.

(d) The voltage variation for changes in load should not be excessive. The load center, due to shifting haulage equipment, is constantly changing. With the class of load found in a mine, heavy load changes at the ends of long lines are very common. Equipment cannot be operated to greatest advantage with too great voltage variations on the system.

(e) The distribution losses should not exceed those estimated as representing the maximum permissible from an economic study of the distribution system.

(f) The fire risk should be reduced to a reasonable minimum.

In a coal mine, the principal application of power was originally to locomotives for main haulage and gathering duty, and as the characteristics of the direct-current series-wound motor are particularly well adapted to locomotive drive, direct-current power was chosen for practically all coal-mine systems. Alternating current could be readily used for other underground applications, such as pumps, fans, drills, coal cutting and loading machines, etc., but since an extensive direct-current distribution system must be installed for haulage it is seldom economical to provide a separate alternating-current power system.

In the case of direct current applications in coal mines, voltages of 250 and 500 have come into almost universal use. The higher voltage has advantages from the standpoint of distribution economies but, due to difficulties with equipment designed for use at this voltage and the increased shock hazard, especially in the case of portable tools, it is not recommended for new installations. In a number of States legislative restrictions have been placed on the use of 500 volts direct current inside the mines.

Both synchronous converters and motor generator sets are extensively used for the conversion of alternating to direct current power in the mines. It is our belief that the synchronous motor generator set more readily adapts itself to a coal mine application than the converter. The reasons are—greater flexibility in direct-current voltage adjustments, increased power factor correction obtainable, and greater operating stability under conditions imposed in the mines.

Within the last few years the development of rectifying tubes for power conversion purposes has given the mining industry an additional type of conversion equipment which has some definite inherent advantages over other types at present used. Briefly, the advantages are high operating efficiency and high momentary overload capacity.

There are quite a number of voltages on alternating current circuits now in common use. Except for use in those locations where large investments have already been made, thereby influencing the selection of new apparatus, practically all alternating current machines are designed for operation at 60 cycles, 3 phase, and at voltages selected after a study of the economic conditions.

In coal mines there are also many local conditions which affect the choice of the most economic voltage but, in general, it will vary with the load factor, the capacity of the installation, and the distance between the generating station and source of load.

Wherever economically justified, the alternating current power circuit is installed outside the mines and the various units fed through suitably located bore holes. In the case of large conveyor installations 2,300-volt alternating-current power is transmitted through the headings to each motor drive with lead-encased armored cables. A 25,000-volt surface transmission line parallels the underground cable and feeds power to it at various intervals through bore holes.

Some thought should be given to the use of so-called portable substations in an attempt to secure the greatest degree of flexibility of the power distribution system, especially when coal is being extracted on the advance and is loaded mechanically. Both the rotating and rectifier types of conversion equipment are available mounted on semiportable truck units.

Due to the large concentration of power and the occasional short circuits caused

by wrecks along the haulage routes and falls of roof, it is vitally important to have installed at regular intervals in the main bus suitable sectionalizing switches. A switch which could with safety be manually operated to interrupt such high currents of power in an emergency was not available on the market. In conjunction with an electric manufacturer of mining equipment, a quick-make quick-break type of knife-blade switch using a magnetic blowout was developed, which has now been in satisfactory service for several years.

We believe our efforts toward securing the best power distribution system possible have been well rewarded.

The electrical equipment inside our mines consumes, on an average, 45 to 65 percent of the power utilized in the complete mine operation and creates 60 to 75 percent of the total maximum demand on the plant. Under various rates of production the number of kw.h. consumed by direct-current equipment will vary from 1.9 to 4.5 kw.h. per ton, dependent upon the physical characteristics of the mine. It is readily seen that power used inside the mines represents a large portion of the total power cost. By proper distribution this cost has been very materially reduced both as to actual quantity of power consumed and created demand.

With rated voltage applied to all electrical equipment we obtain a maximum output per unit of equipment, the delays in production have been reduced to a minimum, and the maintenance cost of equipment has been lowered considerably.

Roof Support Problems in Coal Mining, by **Frank G. Smith**, Gen. Supt., Sunday Creek Coal Company, Nelsonville, Ohio.

The problem of supporting roof in coal mines began when the first deep mine was started. Regardless of the technique of mining coal or the state of the industry as a whole, the original problem is still with us. Changing mining methods, to be sure, have made possible some economies and have made necessary additional expenses, but in the main, the old original problem of holding up the material over the coal seam long enough for the process of mining to be completed is the same.

It is not within the scope of this paper to consider any specific roof support problem, nor is it our purpose to discuss specific methods or materials. However, it might be well to pose certain questions regarding roof support, and while not answering them, to attempt to arrive at a basis for finding the answers.

To answer the question of how to handle any problem of roof support, there are three primary considerations which cannot be overlooked before the job can be done. First comes time. By this I mean the time a given job must last unless it is to be done over. The second is the matter of the work to be done. That is, the amount and kind of material to be supported. The third is the matter of cost. This last must be considered not only from the standpoint of first cost, but also from the standpoint of upkeep.

To sum up, it is impossible completely to separate these three main considerations. They are all interrelated. In other words, the question becomes one of "What will it cost to do certain work for a certain time?"

If the above question is to be answered, it is necessary to have adequate records of the jobs already done. These records must show the cost of material and labor, the kind of work done, the cost of upkeep and the time and reasons for failure.

If we were to spend as much money on a piece of machinery as we do on roof support in several thousand feet of entry, we would set up complete records on its performance and maintenance. Therefore, why not the same for a timber job in a permanent heading?

For purposes of comparison, this should include a physical inventory of the material and labor involved in temporary timbering as well as in the final set-up. Such a record would develop a definite cost per entry-foot for the final job.

The second record to be kept is a definite account of the material and labor used to keep the job in good shape after it is installed. It is reasonable to assume that where the life of a heading is not too long, it might be cheaper to spend some money on upkeep rather than to spend a great deal of money on the original job, and this question can best be answered by the records kept.

There is no necessity of keeping such a record for all of the main haulage headings and air course headings in any mine where the conditions are at all uniform. This, of course, would involve a lot of clerical work and would be difficult to keep. The same data can be collected for *test sections* which are representative of the conditions all over the mine.

In the first place, timbering problems in main headings vary with the purpose and condition of the heading. This, then, must be recognized. It is suggested that these test sections fall into four classifications:

1. Main haulage roads on intake air.
2. Main intake air courses.
3. Main haulage roads on return air.
4. Main return air courses.

In order to make any test section representative, and to make the costs which are developed accurate, at least several thousand feet of heading should be considered.

At present, this method of collecting data is being used by several companies and it is hoped that it will come into use by more. It presents the possibility of collecting a large amount of such data through the membership of the American Mining Congress and making it available in summary form to the whole industry.

Surface Preparation

Economic Possibilities of Small Coal-Cleaning Units, by **J. P. Horne**, Gen. Supt., Raven Red Ash Coal Co., Red Ash, Va.

Too often the term "coal mining" is thought of as a matter of production only, when its broader meaning, production and sales, should be used, for without sales there would be no production.

This paper is directed, principally, to small operating companies, since it is assumed that nearly all of the larger organizations are thoroughly up to date on preparation and realization by reason of their size. Or perhaps close attention to these two points is one of the reasons why they are large.

Almost without exception, coal mining organizations conduct most strenuous campaigns to reduce cost of production. To reduce the cost 1 or 2 cents per ton is considered an achievement well worth while, and it is. But how many organizations conduct such campaigns or surveys with the idea of increasing the selling price of their product or obtaining more regular operation as a result of A-1 preparation?

Where all sizes at a particular mine need cleaning and it is not possible to finance such a large installation at one time it is possible and sensible, by means of the small coal-cleaning unit, to do this gradually, one unit at a time, as finances permit—starting, of course, with the size or sizes that need cleaning most.

Sometimes it is thought that one size of coal at a particular mine needs cleaning badly, but that the tonnage of this size is so small that a cleaning unit is not justified. A careful check-up may show that while the adjacent sizes have been moving fairly well, yet they contain some impurities. Then the logical move is to install a cleaning unit, clean all three sizes and make a first-class product of all of them, whereas before two of the sizes were fair and one was bad. Most units will clean three sizes at one time and separation can be made after cleaning.

The best program ever presented at Cincinnati was delivered to crowded meeting rooms at virtually all sessions

In the selection of a cleaning unit thought should be given to several items: (1) Amount and kind of water available, if that type of washer is desired; (2) severity of the winters, due to tendency to freeze in all parts of a water washer and in conveyor lines carrying wet coal, refuse and sludge; (3) in the cleaning of slack or nut-and-slack the moisture content of the raw coal is quite important if dry cleaning methods are contemplated; (4) breakage; (5) equipment that requires a minimum of adjustments should be selected; and (6) capacity—sometimes cleaning units are purchased that are overloaded when placed in service or soon thereafter; it is much better to have the unit oversize than undersize.

For slack and the smaller prepared sizes bins ahead of the cleaning unit are advisable because then temporary stoppage of the cleaner will not stop the tipple.

The economic benefits to be derived from the installation of small coal-cleaning units are numerous.

Three items are essential to the successful operation of all coal mines. They are: (1) Lowest possible cost of production, (2) good running time, and (3) maximum realization.

BYRON M. BIRD

Chairman of the Session on Surface Preparation

The mechanical coal-cleaning unit has a vital bearing on all three points. It will greatly aid in obtaining maximum realization. In fact, except in rare cases maximum realization cannot be obtained without mechanical cleaning.

The cleaning unit will also materially assist in obtaining good running time, and good running time cannot be otherwise attained, except for a fortunate few.

Lowest possible cost of production cannot be obtained anywhere, at any mine, without good running time.

You will be assured of a product of almost unvarying quality. Your prepared sizes will have less slack, no dust, and will present a much better appearance.

Your tipple force will be reduced, due to the elimination of slate pickers and coal inspectors.

Mechanical loading inside the mine can be done, in so far as preparation is concerned, where it would be impractical without mechanical cleaning.

You will retain customers when they know that every car of coal you ship them will be of uniform preparation.

A reputation for unvarying quality will bring new customers.

You will save time and expense by not having complaints and not having to make investigations and reports as to when the coal was loaded and who was responsible.

You will save money by not having to make rebates for poor preparation.

Your operating organization will have more time to devote to tonnage and cost.

You can demand maximum prices for your product.

The sales department or organization will no longer have an alibi.

In the matter of regulating receipts and expenditures the small coal-cleaning unit offers, perhaps, greater economic possibilities than any other phase of coal mining. This may be disputed by some who will say that mechanization inside the mine offers greater opportunities. But mechanization is not applicable to all mines on account of varying natural conditions and may not be practical without mechanical cleaning. Small coal-cleaning units are applicable to all mines.

Pyrite Recovery from Coal Mine Refuse, by K. A. Spencer, Vice Pres. and Mgr., Pittsburg & Midway Coal Mining Co., Pittsburg, Kans.

The pyrite recovery plant of the Mineral Products Company is located at West Mineral, Kans., adjacent to the Central Cleaning Plant of the Pittsburg & Midway Coal Mining Company. Coal is produced by strip mining, and at this particular plant two electric stripping shovels are engaged in uncovering the coal.

[Detailed description of plant developmental experiments, and description of plant and flow sheet.]

The plant, costing some $170,000, is housed in a steel structure with concrete slab floors. Each unit is powered with individual motors and where required, individual speed reducers. The plant is heated with a 150-hp boiler and unit heaters. The plant contains 44 motors, totalling 312 hp. Water is furnished from a surface lake nearby and is calculated at the rate of 3,500 gallons per minute.

This plant has been virtually in continuous operation since July, 1936; a typical month's operation may be summarized as follows:

Total tons milled	9643
Shifts operated (8-hours)	29
Hours operated	223
Possible hours	232
Per cent running time	96.1
Tons milled per hour of running time	42.24
Tons of coal produced (or 22.39% of mill feed)	2158
Tons of pyrite produced (or 17.75% of mill feed)	1712
Average ash of coal produced	10.09%
Average sulphur content of pyrite produced	45.51%

The average realization for the products for the month above mentioned was $1.38 net per ton of coal produced and $2.38 per net ton of pyrite, f. o. b. mill. It is obvious that this resulted in a marginal operation, and some credit should be given to the coal mining operation for disposal of refuse.

In considering the economies of such a plant it must be borne in mind that at present there are relatively few concerns utilizing pyrite as such, particularly in the middlewest where a majority of the high sulphur coal occurs from which pyrite can be economically recovered. The principal outlet for the concentrated pyrite being to the manufacturers of sulphuric acid who are using it to replace brimstone.

Pyrite produced in the middlewest has not found its way into many industries other than production of sulphuric acid, small quantities are used in the glass industries for manufacturing amber colored glass, in the cement industry for its iron content for high iron concrete and miscellaneous small uses. Pyrite, as such, carries a relative high freight rate which limits the shipping radius. It is therefore expedient in thinking of a pyrite recovery plant, to consider it as simply the first step in a plan that will finish with a more valuable product such as sulphuric acid, liquid sulphur dioxide or phosphate fertilizer, which would stand a higher rate to a consuming market.

In summarizing, however, it may be said that where there is a concentration of high sulphur coal mine refuse which presents a more or less difficult disposal problem, pyrite recovery is practical for a mining company which has this problem. Our operating experience indicates that under the present selling prices of pyrite, washed coal and cinder and with the present ratios of concentration, the operation will not permit any inbound charges on coal mine refuse from other sources.

However, if a mining company has a consistent supply of refuse available, an assured outlet for the coal, pyrite and resultant iron cinder, together with favorable physical conditions, then the whole operation should be a profitable enterprise if amortized over 10 or more years.

Coal Cleaning in the Appalachian Fields, by Joseph Pursglove, Jr., Gen. Mgr., Pursglove Coal Mining Co., Pursglove, W. Va.

Coal has been mined for over a hundred and fifty years in this country, but up to 1920 only 4 percent of the total production had been mechanically cleaned. Practically all this cleaned tonnage was confined to one state, Alabama. The year 1920 more or less ended the Bonanza Era when anything black or even dark grey could be palmed off on the public, and this consuming public began to realize that some money could be saved by looking into fuel economies.

For seven years very little more coal cleaning progress was made in the industry, but in 1928 the curve of the mechanically cleaned tonnage took a turn upward. Pennsylvania, for instance, increased from about 4 percent in 1927 to almost 20 percent in 1936; in West Virginia and Virginia from around 3 percent to 12 percent; in Ohio from under 1 percent to over 5 percent. It is estimated that these percentages will all be upped from 5 to 10 percent by the end of 1940. With these percentages in mind, it is apparent that coal cleaning in the Appalachian fields is really just getting off to a good start. This curve will undoubtedly continue to rise each year because the two forces that started its rise in 1928 and kept pushing it upward each year are at work more energetically today than ever in the past. These two closely related factors are (1) mechanical loading underground and (2) the extremely competitive market for energy fuels requiring the best possible product at the lowest possible cost.

The Appalachian producing fields cover a huge area, including scores of coal seams mined by hundreds of different methods and organizations. One therefore could not expect all the companies in the various producing districts to solve their problems in a similar manner. With the country swarming with cleaning-plant salesmen making confused claims to bewildered operators, two definite trends have developed. There is a well-defined feeling that it does not pay to wet-wash coal below ⅜ in. or ¼ in. at the lowest point, and that it does not pay to dry clean coal above ½ in. or possibly ¾ in. at the top. The new plants built in the past two years, with few exceptions, confirm this trend.

In recent construction the Willow Grove and Dun Glen plants of the Hanna Coal Company in eastern Ohio, and the Isabella plant of the Weirton Coal Company in western Pennsylvania, seem to be the only exceptions to this trend. In these plants all coal from around 4 in. to 0 in. is wet washed. The Hanna plants are equipped with heat dryers to remove the excessive moisture from the cleaned fines, and the Isabella plant is equipped with water clarifiers, vacuum filters, and centrifugal dryers. The Isabella plant prepares metallurgical coals for shipment by river barge to the mills of the Weirton Steel Company, so it represents a specialized solution to a cleaning problem.

Although there is a definite trend regarding the wet washing and dry cleaning of certain sizes, there appears to be no standardized method of doing the wet washing and the dry cleaning. The plants mentioned above illustrate this point.

In such a concentrated producing district as Monongalia County in northern West Virginia, three different makes of wet washing cleaning devices are used in the four plants. Where dry cleaning is used in these latest plants, Stump boxes seemed to be the unanimous choice. Perhaps this marks the beginning of another well-defined trend in coal cleaning as it is the only consistent factor in this review of new plant equipment.

Coal cleaning in the Appalachian fields is very definitely on the march. Where the rising curve of cleaned coal tonnage will level off no one can predict, but my guess is that it will continue to rise steadily year after year until it reaches at least 50 percent. It is an extremely healthy sign that the coal industry is finally beginning to equip itself on a large scale where it can seriously combat competitive fuels by mining and preparing the best possible coal at the lowest possible price.

Modern Cleaning Practice in the Rocky Mountain Field, by **Carl S. Westerberg**, Prep. Engr., Utah Fuel Co., Castlegate, Utah. Read in the absence of the author by **W. N. Wetzel**, Gen. Supt., United States Fuel Co., Hiawatha, Utah.

The Rocky Mountain coal-producing field includes Utah, Colorado, Wyoming and New Mexico, or Districts 16, 17, 18, 19 and 20 as defined in the Bituminous Coal Act of 1937. The preliminary total production figure from this field for 1939 is 15,008,000 tons. Of this total approximately 3 percent was mechanically prepared by one process or another. This indicates that mechanical preparation of coal in this field is yet in an undeveloped state. The tonnage above includes the coal prepared in the most primitive type of tipple with facilities for making but one size separation and the most modern type of preparation plant embodying washing, sizing, drying and blending operations.

There is a great variety of sizes made in this area, but the significant factor is that 57.40 percent of the total coal produced in these states in 1938 was below 3 in. in size. For some large producers in this area the proportion is 75 percent or over of this minus 3-in. coal. This proportion grows higher every year as consumers turn more and more to mechanical stokers, and this trend must be considered in designing a mechanical cleaning plant.

In planning a mechanical preparation plant to replace or supplement a present operation we realize that every operator has his own unique problem or combination of problems. Also we submit that there are certain fundamental points which all operators must consider in modernizing their preparation facilities. Certainly one of the first considerations must be consumer demands.

The Utah Fuel Company, of Salt Lake City, Utah, has recently completed the erection of a new preparation plant. The process by which the type of plant erected was selected might be considered more or less typical of the manner any western producer would approach the problem.

All considerations made it most practical to wash only the —3-in. fraction of the mine run of coal, hand picking the balance. It also became apparent that it would be of advantage to wash the product of other Utah Fuel Company mines at this plant. Hence studies were made of the coal from each of the mines, and facilities for handling such coal were to be included in the design of the plant.

Consideration was given to the possibility of using pneumatic cleaning for the small sizes of coal, wet washing the balance up to 3 in. in size. It was determined, however, that the moisture content of the mine-run coal varied above the limit of the ability of a dry-cleaning unit to yield efficient results.

The above information was worked up as a prospectus and submitted to contractors and the Link-Belt Company's design accepted. This company began construction in September of 1939 at Castlegate, Utah, and completed it to allow a test run on February 13, 1940. On the 24th of February the plant was officially opened and has been running ever since.

The plant was designed to handle an initial capacity of 250 t.p.h. of raw 3-in. minus coal with conveying equipment large enough to handle an eventual capacity of 400 t.p.h. The plant has already been run successfully at 277 t.p.h.

From the public enthusiasm for the new product of this plant, it seems that this type of preparation has fully caught up with consumer demands. The situation with this operation now resolves itself into working out the most efficient possible processing consistent with economy and quality of product.

It appears that only about 5 percent of this year's production from the Rocky Mountain Field will be scientifically prepared to meet the demands of consumers.

It would be impertinent for the writer to presume to forecast the trend in coal preparation in the West, but two factors are evident: (1) that uniformity of fuel above all else is wanted by the consumer, and (2) the only means of supplying a uniform fuel is by modern mechanical methods.

Mechanical Loading and Conveying

Duckbill Mechanical Loading, by **V. D. Picklesimer**, Gen. Supt., South-East Coal Company, Seco, Ky.

The South-East Coal Company has mined coal in southeastern Kentucky since 1915. Its two operations with drift openings in the Elkhorn No. 3 seam are located on the headwaters of Kentucky River. Room and pillar system of mining with hand loaders paid on a tonnage basis has been used throughout until mechanical loading using shaking conveyors with automatic loading heads was introduced in our Seco No. 1 mine in September, 1939.

Goodman shaking conveyors with the automatic duckbill loading heads were decided upon, and the first two were installed and put in operation September 5, 1939. More were installed in units of two each at intervals of about six weeks until on December 16, 1939, we had a total of eight duckbills producing most of the tonnage loaded at our Seco mine. Hand loading was reduced as tonnage from the duckbills increased.

During the few months we have had this equipment we have mined some coal

ROBT. G. PFAHLER

Chairman of the Session on Mechanical Loading and Conveying

from all the different sections of the mine and encountered most all the problems that could be expected from varying top and bottom conditions, heights of coal from 40 in. to 65 in., and the different systems of working rooms and entries. In all instances we have kept two conveyors on a section both discharging at a common loading point into one mine car. The cars are kept coupled in trips of about 20 cars on the entry and moved for loading with a trip hoist. No accessory equipment, such as mother conveyors or elevators, has been used.

Maintenance of equipment has been given careful consideration. Regular and systematic inspections of electrical equipment and inspections and adjustments of mechanical parts apt to give trouble have eliminated so far any major breakdowns that might have taken equipment out of production. We were required to reinforce the first duckbill loading heads soon after placing them in service, but later ones came reinforced from the factory.

A complete system of records is kept as to production, maintenance and supplies.

Many problems have been presented in the change from hand-loading to mechanically-loaded coal. Two shifts per day were required. Haulage and other routines were changed completely. Not only was it necessary to train crews in work that was entirely new to them, but foremen found themselves facing an altogether different routine both as to production and the handling of men. Safety of workers and equipment has been given first consideration, face preparation second, and then production of coal. We soon realized that the success of our mechanization program depended upon the continuous flow of coal from the face to the railroad cars. Every effort has been put forth to accomplish this, and as foremen and crews became better trained we are encouraged by a gradual but regularly increasing production per man employed.

Now with better than 80 percent of our daily tonnage coming from the duckbills, we find the analysis of our coal in the railroad cars better than when all of it was coming from hand loaders. The 2-in. minus product increased 8 percent, reducing the 5-in. block 6 percent and the egg size 2 percent. Part of this reduction in larger sizes is due to the change from pellet to permissible explosives and the fact that one-half of our mechanical equipment is in barrier pil-

lars. We find our supply and power costs increased 25 percent, total mine labor costs reduced 30 percent, and a 20 percent reduction in the total cost of producing coal.

We are convinced that the success of any mechanized mining program is determined first by the selection of a type of equipment best suited to the conditions found in a particular mine; second, by a well-planned application of this equipment to that mining system that will give the best recovery consistent with safety and production; and third, by close supervision, correct maintenance, and the personnel and training of foremen and their crews.

Mechanical Loading Onto Conveyors, by **G. S. Jenkins**, Asst. Gen. Mgr., Consolidated Coal Co., St. Louis, Mo.

In discussing this subject references made refer to operations at our Buckhorn mine. This mine was sunk with the idea of its being a conveyor installation, which of course necessitates a slope with the hoist belt, a hopper at the bottom, with a suitable feeder and large drop-bottom cars for main-entry transportation. Rail haulage does not extend into the panel entries, the coal being transported in these panel entries by means of mother belts, gathering from rooms being accomplished by means of sectional drag-flight conveyors which discharge onto mother belts. Material transportation in the panel entries was one of the main difficulties, but this was overcome by means of a short-coupled, storage-battery powered, rubber-tired truck, which handles the material from the main entry up the panel entry to the face of the working rooms, traveling over the conveyors at almost any point without difficulty. The loading machines used are mounted on endless tracks and these, too, cross the pan conveyors over ramps thrown up at the cross-cuts. These ramps consist merely of several ties thrown on each side of the conveyor, with loose coal thrown on top of them.

Our experience to date has indicated that the economical cutting machine at our installation is a shortwall type, which we transport from room to room on a machine truck equipped with endless tracks. Drilling is done with a conventional type post-mounted drill, which is transported from place to place by the drillers, who carry the drill and augers between them.

Coal has been broken down by several methods, including permissibles, Airdox, Cardox, and the du Pont hydraulic snubber. Within this paper I will consider the method we have used covering the majority of working shifts, which happens to be Cardox.

This is a development mine with considerable experimental work going on, and we have not striven to produce a large tonnage. We have determined that one mother belt can easily handle the surges from three loading machines, and we have additional gears whereby we can speed up the mother belt and handle as high as four loading units. While there is a question in our minds as to whether the economical thing to do is to run the machines at high capacity or to run more machines at a smaller capacity, I believe the latter case is more desirable inasmuch as we are working the units in a highly concentrated area; and there is less congestion and better supervision of the working places.

As to the feasibility of moving the various units in this concentrated territory, I might state that the shortwall cutting machine undercuts on an average of about 12 places in a 7-hour shift, with a high of 18 places in that time. This, of course, necessitates the drilling of approximately 100 holes per day for each unit.

In trying to outline and classify a crew in a conveyor mine, it is almost an impossible task inasmuch as the class of work varies from time to time, and the men work in several classes, one of the main difficulties being the extension of the sectional drag flight conveyors to the face.

During the last 3 months, the 4 loading units have averaged 1,600 tons per day, with the maximum output of 2,200 tons.

In transporting the conveyor pans, they are either loaded on the rubber-tired truck, or onto the caterpillar transfer truck and moved to their next position. The drilling equipment is usually thrown upon the loading machine and moved to its new position along with the loading equipment. Timber and material is lowered into the mine in cars, hauled to the loading point, and then taken inside by means of the rubber-tired truck.

I might mention, in passing, that considerable experimenting has been done in snubbing down the coal with the du Pont hydraulic tube. Our experience is that it is necessary to drill only one additional hole in order to snub a place than to break down the place by other means. In loading this snubbed coal, it is not necessary to snub the lower bench and then load it; instead, the lower bench is first snubbed, taking care that the undercut is blocked in order to crack the lower bench sufficient to admit the ready entrance of the loading machine. After snubbing this lower bench, the tubes are then placed in the top holes, and this upper bench snubbed right on top of the lower bench. Surprising as it may seem, a good shear at the rib results, and the coal produced is of such size that it can be readily loaded. You can realize that by this means of using a tube expanded by hydraulic pressure, very little damage to the roof can result. As to the amount of coal this snubbing device can handle, I might mention that it has been handling the output of two loading units without difficulty, and that the life of the tubes is now running between 750 and 1,000 expansions; thus making the cost competitive with other means of preparing the coal for loading.

Multiple Conveyor Units and Economical Operation, by **W. J. B. Mayo**, In Charge of Conveyor Mining, The Koppers Coal Co., Pittsburgh, Pa.

The room and pillar system is more universally used than the longwall system of mining so commonly used in the early stages of mechanical mining, which system retarded its growth somewhat due to severity of long fracture lines until the former method or modified mining was adopted.

Some of the outstanding fundamentals involved in a multiple conveyor unit set-up are safety, preparation, earnings of the men and finally cost.

I am an exponent of two conveyor syndicates for the highest production per unit shift and lowest cost results. Up to this time the history of conveyor mining leads me to the conclusion that where more than two room conveyors empty onto a mother conveyor of the average capacity, the efficiency curve begins to flatten out and frequently drops with consequent lower tons per unit shift and higher cost.

The average room conveyor is designed to convey 300 tons of coal during a 7-hour work day. A syndicate of conveyors conveying an average of 100 tons per unit shift in a thin seam of coal is considered very good performance, even though this is only one-third the rated capacity of the equipment.

After reaching this point [low efficiency] it is time to turn your floodlights on in order to step up production, increase the earnings of your loaders and cut cost.

Crew leadership and loader training follows and is in no manner the least important. This can best be accomplished by a practical "Methods Supervisor" living with the crew and giving actual demonstration. The supervisor must bear in mind that slipshod and hit-or-miss methods—age-old habits of the past—must be replaced with habits of planning and working with efficiency and dispatch. He must not leave a crew until they are sold that the new method will be beneficial to themselves as well as to the company, because the proper investment of time is the main purpose of any supervisor in the new mechanization trend.

The efficiency of loading crews also depends upon adequate power, proper maintenance, and periodic inspection of all mechanical equipment.

Management must be assured of a consistent and maximum output each unit shift. Much lower cost of production must be obtained to take care of a high depreciation cost, and yield a return on the investment.

Shrinking markets, declining prices, increased wages, higher taxes and other restraining factors present a real challenge to mine management in the American coal industry. Mechanization is its brightest hope for the future.

Equipment Maintenance

Organization of Maintenance Crews in Mechanical Loading, by **C. R. Nailler**, Supt., Willow Grove No. 10 Mine, Hanna Coal Co., St. Clairsville, Ohio.

Maintenance and its proper organization has been a neglected problem in the mining industry. It was in much the same position as was mining engineering, safety, coal preparation and other related phases which the industry has long since truly evaluated and incorporated into its scheme of operation. The reason maintenance has lagged behind other branches of the industry is because the greatest emphasis has been placed on operation. Mechanical mining has forcibly brought to our attention the need of proper organization and incorporation of maintenance into the coal production system.

In mechanical mining, organization of maintenance must start at the top by being placed in a parallel position with operation, preparation, engineering, purchasing, etc. Next, this department, as all other divisions, must be kept well informed of the production of objectives of the entire mining operation. This is necessary in order that the master mechanic may be able to intelligently plan his departmental activities and make them a harmonious part of the mining system.

Maintenance, itself, must be properly organized to get the most out of the man power, kilowatts, equipment and available materials. This is done by establishing a system which provides for (1) field inspection, (2) work scheduling and (3) proper handling of personnel.

All of the splendid organization within the maintenance department is as a house of cards, unless production and management contribute their help and cooperation. Of what avail is field inspection, work scheduling, etc., unless management provides proper spare equipment that will enable maintenance to perform efficiently without having the operating department at its throat because needed production equipment is tied up? What good is regular rebuilding or scheduled repairs if the production department doesn't insist upon proper operation of machinery.

P. L. DONIE

Chairman of the Session on Equipment Maintenance

Proper operation of equipment can be greatly stimulated in the following ways: (1) by giving publicity to the maintenance cost of machines run by individual operators, (2) by inspectors who check lubrication and machine operation, and (3) by publishing, through joint conferences of the operating and maintenance departments, operating manuals for each type of machine. The object of such manuals would be to induce machine operators to take better care of their equipment as well as to produce excellent tonnage. They would contain an explanation of various parts of the machines and their functions, the correct method of lubrication, safe and trouble-free operating practices, general trouble shooting instructions, etc.

A two-month training period in the machine shop for each section foreman would greatly add to his understanding and appreciation of the equipment and enable him to solve his own mechanical delay problems.

Methods of Keeping Detailed Cost Records on Stripping and Coal Loading Shovels, by **W. W. Youngblood,** Supt., Midland Electric Coal Corp., Farmington, Ill.

The first work to be done in a strip coal area is the prospect drilling and mapping. Holes other than coal boundary holes are drilled systematically throughout the entire probable strip area. In all fields, the edge or boundary of the coal is drilled on close centers ranging from 150 ft. to as close as 50 ft. In some fields, such as those found in the northwestern part of Illinois, it is necessary to make a much closer drilling of the entire field. It has been my experience in these fields that topographic maps may be made with not more than 5 ft. contour intervals.

Departure and latitude lines are established by station numbers of 100 ft. per station and are plotted on a large scale progress map in the engineer's office.

By the use of a polar planimeter the areas dug each shift are measured and, together with the depth of overburden as reported on the shovel performance sheets the yardage in the solid can accurately be determined.

The progress map shows the up-to-date location of both the dirt stripping cut and the coal pit. By continuous observation and study of this map each day it is much easier to economically mine out the entire recoverable coal area. It is always desirable to make advanced pit layouts on this map, from which future dates and direction of pits can be determined in order that proper drainage ditches can be made to remove the maximum amount of the surface water that otherwise would drain into the open cut.

One proven method and procedure used in making daily reports of shovel performance is by making a complete written report for each working shift for both the stripping and coal loading shovels. These reports are made on standard printed performance sheets which show: measurements for locating the pit; the number of swings made; a complete time record showing time spent in digging, levelling, moving, oiling and other delays; and a record of all supplies and repair parts used, giving part numbers for accurate and prompt material cost charges made daily to each shovel.

From these reports a complete record is kept up to date for each shift as well as for each shovel.

All shovel operators are invited and encouraged to look over these reports as often as they can with the idea of letting the operator know what he has accomplished, and, by conferring with the management, a closer cooperation is attained for getting and keeping the shovels at their peak performance.

In order to get a more complete and accurate time study and a record of operator's digging methods, the installation of time recording instruments is coming into common use. The instruments make a continuous graph record of the swinging or rotating arc of the shovel as plotted against time. From a study of these charts, the exact movements of the shovel throughout its digging cycle can be seen.

One stripping shovel in an operating pit is the usual practice in most mines. When the overburden gets too deep for the shovel it is then common practice to assist it by using a dragline for going beyond the shovel range. A more recent practice is to increase the yardage output in overburden that is low enough for shovels to handle by the use of two shovels in one pit operated in tandem. This is being successfully accomplished by using a shovel of large capacity with rather short boom and dipper sticks for digging the close part of the cut and dumping in the waste bank as close in to the shovel and from as low an elevation as possible.

Opening box cuts to start a new pit in deep overburden and in soft material that stuffs badly has been economically accomplished by the use of tandem shovels. The general procedure where the depth of overburden will permit is for the large capacity shovel to dig the overburden from the bed of coal in the ordinary manner. The second shovel travels on top of the ground and progresses ahead of the first shovel directly in front of the spoil thrown up by the first shovel.

To keep stripping and loading shovels in good repair is very important, but the major maintenance and repair jobs must be planned ahead so the shovels will be able to carry through the peak production period at their top capacity if at all possible. This means close and thorough inspection at regular intervals to determine the condition and wear of all parts. By doing this, most defects, breaks, or worn spots that may cause future failure are detected. Thus a repair job is anticipated and planned as far in advance as possible, allowing the most time to arrange the operation of the pit for continued production before shutting the shovel down.

In any shovel operations, whether they be single or tandem, coal loader or stripper, digging or repairing, accurate and complete daily records should be kept at all times, for it is from these records only that accurate detailed costs can be made.

Method of Keeping Detailed Cost Records of Overburden Drilling and Shooting, Preparation and Haulage,

by **C. W. Woosley,** Gen. Supt., Pyramid Coal Corp., Pinckneyville, Ill.

The making of a cost statement is a simple job in itself, but to keep cost records which give all the minute details of the operations requires close scrutiny as well as cooperation among the various departments.

Opinions differ very widely on the lengths to which it is advisable to go in the maintenance of cost records, and I would not be inclined to disagree with anyone who would say that a certain cost record was either insufficient in detail, or to the extreme. What might prove to be insufficient in one operation would be an extreme in the other and vice versa. I would say, however, that I believe a certain degree of flexibility should be the general rule in the maintenance of detailed costs. The extent of this flexibility would depend upon changing conditions or equipment from time to time, any of which might make it advisable to divide and subdivide costs for analysis.

In giving a method of keeping detailed costs on shooting overburden, it is necessary to some extent to include and make mention of the overburden drilling. Drilling and shooting costs, while separated for accounting purposes, are combined for analytical purposes, as these two operations are, to a great extent, interwoven. For the purpose of following the detail we have our "Symbols" which set up the following accounts:

Labor—

Account 1. Drilling cover.

Account 3. Shooting cover.

Supplies—

Account 2. Drilling supplies.

Account 4. Shooting supplies.

Overburden shot-firers have a Daily Drilling and Shooting Report which is filled out for each drill for which they shoot. This report shows the number of holes and formation. This information is taken from the drillers. The shot-firer then shows the amount and kind of explosives used. When this has been noted we have a complete record of each hole drilled and shot. These reports are turned in at the end of each shift and kept until the end of the month at which time they are tabulated in order to get the monthly performance.

The time turned in for the drillers is charged to Account 1, with the symbol a, b, c, d, e or f after same, to indicate whether it is regular operating labor or repair labor, and what type of drill the work was on. All odd numbers would represent labor and even numbers supplies. Supplies as used would be charged to Account 2, with the symbol a, b, c, etc., to designate the type of drill on which used.

We have followed the same procedure in keeping preparation costs as in drilling and shooting. These costs have been subdivided into brackets which we felt would be of advantage to efficient operation, and the brackets we found desirable are listed as our "Symbol of Accounts." These brackets, together with the reading on method of keeping drilling costs, would be identical. Our subdivision classes are as follows: Operating labor, repair labor, operating supplies, maintenance supplies, oil treating, calcium treating, energy, and total.

With respect to Haulage Cost and Operating Records, each truck driver fills out a Daily Drivers Report covering the truck he operates. This report shows, principally, the hours the unit operated and the time lost. A notation is made of the cause of the delays. Any tire changes are noted so that an accurate record of tire mileage can be determined;

also, the distance traveled and tons hauled. The report also has space for any recommended repairs needed which are passed to the shop foremen for investigation. These reports in turn are used for compiling the information which we tabulate monthly on a Summary of Operating Data for Haulage Trucks. This report, together with the detailed costs as kept, gives us our final Monthly Truck and Roadway Cost Analysis. The same procedure is followed in keeping these costs as in Overburden Drilling and Preparation Costs. The subdivisions in this bracket as to costs are as follows:

Truck Haulage Operating Labor.
Truck Haulage Repair Labor.
Haulage Road Maintenance, Operating Labor.
Haulage Road Labor, Repair, Maintenance and New Roads.

Supplies are kept in the same manner, and then the two combined as explained under Preparation.

Breakdown Prevention Through Machine Inspection and Service Records, by **Carr McCormack, Jr., Newcastle Coal Co., Newcastle, Ala.**

One of the surest paths to efficient and economical operation of a coal mine is by way of the old saw, "An Ounce of Prevention is Worth a Pound of Cure." In the process of placing this into practice there are two major approaches. One through the furnishing of spare units always ready—the other through intensive inspection and service with the necessary records to assure that the work has actually been done as indicated.

Periodic inspection with records made for ready reference always accomplish two results which are followed by more nearly uninterrupted operation. The first being an assurance that inspections and corrections are actually made; the second, in the event of carelessness the responsible party is immediately marked. Routine intensive inspections of all units are made by other than the operating or repair crews, and weekly records are made so that the progressive wear and tear may be checked and an average economical life may be predicted.

There are also Shift Reports that give a general idea of the workable condition of each of these pieces of equipment at the end of each shift; these permit the regular repair men to go immediately to the site of any possible trouble without waiting for a breakdown to occur. These Shift Reports are made by the operator of that particular piece of equipment and are OK'ed by his foreman.

Regarding stationary units, such as motor generator sets, main pumps, gathering pumps, spray pumps, etc., a written report of the exact condition of such units is made to the mine foreman and copies go to the repair crews. When the Inspection Report shows the reasonable life of any part of the unit is nearing its end an exchange is made, the worn unit serviced and it then becomes the spare. Blanket reports on motor conditions are used. These units are inspected, blown out and checked bi-monthly and a written report made to the superintendent.

The effectiveness of the above system of records is attested to by the fact that from July, 1936, through March 20, 1940, there were only 11 breakdowns that involved more than one hour of full mine operation. This covers a production of 762,135 tons of coal on a basis of an average daily tonnage of 1,100 tons, or a breakdown for every 69,285 tons produced. Of this total of 11 breakdowns, one was caused by rockfall on the hoisting slope, seven by power failures, due to other than switch gear or mechanical causes, preventable by inspection, and only three from mechanical failures preventable by inspection and service records. This raises the tonnage per preventable breakdown to 254,045 tons. On a basis of 1,100 tons per day this is the equivalent of one breakdown per 231 days of operation.

Mobile Loading Machines

Shuttle Haulage for Mechanical Loading—Review of Developments, by **H. B. Husband, Gen. Mgr., Fuel Operations, Chesapeake and Ohio Railway Co., Dorothy, W. Va.**

Rubber-tired service cars or "buggies" made their first appearance in the fall of 1936. The first installation was at the mine of the Blue Bird Coal Company at Carrier Mills, Ill., and the second one followed immediately at the mine of the Hart Coal Company at Mortons Gap, Ky. The development of these cars, however, started many years before as an idea back in the days when an output of 60 tons in an 8-hour shift was a creditable performance for a mechanical loader.

An engineer, looking ahead and thinking, saw that the mechanical defects in the loaders would and could be corrected and that in a comparatively short time the loaders would be loading five to six tons per minute and that the big problem would be the same as it was then—how to move the coal away from the loading machine fast enough to keep the loader loading.

Mr. J. H. Fletcher of Chicago, is, of course, the engineer I have been talking about and being a thorough, capable and courageous engineer, he did not hesitate in planning something radically different. He ran into the usual difficulties of anyone trying to change an established system and could not find anyone to build the cars he had designed. Sanford-Day did agree to build the doors for the car, but Mr. Fletcher had to build the cars or trailers himself in the shop of the Blue Bird Coal Company, and only b personal connections was he able to induce Baker-Raulang to furnish the tractors to pull the cars.

The results at the mines of the Blue Bird Coal Company, Hart Coal Compan Moffatt Coal Company and Engle Coal Company are well known and need no comment.

Mr. Fletcher and Mr. A. L. Lee have designed a "Koal-Mobile," and the first two will go into the mines of the Union Collieries Company.

The Joy Manufacturing Company, watching and studying the performance of the Fletcher units, developed their shuttle car. The first one had a capacity of 6 tons and was installed late in 1938 in the mine of the Katherine Coal Company at Lumberport, W. Va. The results the mine management got with entirely new equipment and an entirely new idea were unbelievable unless one went into the mine and saw the performance. At the present time the Katherine Coal Company are using eight shuttle cars.

There are now in operation more than 100 shuttle cars in addition to the Fletcher units. There are about 80 cars on order or in the process of manufacture, and the first 10-ton shuttle car was recently shipped to Sheridan-Wyoming Coal Company. This car is going into 14 ft. of coal.

I cannot say that all rubber tired installations have been a success. Structural weaknesses have appeared in some of the cars, but this is a matter of mechanical detail and has been and always can be corrected. No engineer can anticipate all the strains that a car traveling over a mine bottom is subject to, and when one considers the short period that rubber tired haulage has been in use, the fact that the cars have performed as well as they have is a credit to the engineers who designed them and to the operators using them.

C. J. SANDOE
Chairman of the Session on Mobile Loading Machines

Serious changes are taking place in coal mining methods, changes over which operating men have no control. Most of us, and most industries, do not like change, yet change is the inevitable law of survival. Undoubtedly hand loading is the easiest form of coal loading, requir as it does the least capital, the least planning and the least supervision; but changes are forcing mechanical loading, which is always difficult and requires the most capital, intensive planning and intensive supervision. Increased mechanical loading is forcing changes in face transportation.

The bulk of production naturally shifts to the areas able to market their coal the best, either because of a lower price or superior quality, and as combustion engineers develop new ideas and apply them to the burning of inferior grades of coal, the time is coming when the superior coal will have to compete with inferior coal on a price basis, and the 36-in. coal will have to compete with the 84-in. coal on the same basis.

Shuttle Car Haulage with Mechanical Loading, by **Harry S. Gay, Gen. Mgr., Gay Coal & Coke Co., Mt. Gay, W. Va.**

The writer is not presuming to act the role of an authority on shuttle car mining. He is indebted to Mr. J. H. Fletcher, an engineer of Chicago; to Mr. Hert Hart, manager, the Hart Mining Company, and to Mr. Herman Ober, manager, the Katharine Mining Company. These gentlemen are pioneers with this new system of mining. My remarks will therefore be confined to the experience obtained by the Gay Coal and Coke Company with shuttle cars operating in its No. 3 mine.

After we had decided to install shuttle cars, we sent our electricians and the assistant foreman to see the system in operation at Katharine. We had one of our electricians spend a week at the factory. Then we assembled the crew which was to perform the work on the day shift, which was the only shift we planned to operate the shuttle cars, and fully explained to the men what we expected to do. We endeavored to convey the fact to this crew that we were trying something entirely new in thin seams, and if successful we hoped to reduce our cost and thus be in a better position to operate more regularly. I am making a point of this because I feel confident the results we so quickly obtained would not have been possible without the whole-hearted efforts which all the employes exerted.

I am not going to devote any time to this important subject which has been covered very thoroughly in papers read at past meetings. I nevertheless desire to mention that the success of this system depends largely on continuous operation, and this means proper maintenance before breakdowns occur. More equipment is used with this system so that more careful examination of the electrical machines is necessary. We have a card system of reporting breakdowns and possible breakdowns so that the operators and foremen do not depend upon the electricians' memory to do the work. The foremen and superintendent also know when the work was done and the new parts used.

The week prior to the installation of shuttle cars, we produced an average of 327 tons in two shifts loading into the mine cars. The first week operating shuttle cars in this new section we averaged 612 tons; the second, 600; the third, 524; the fourth, 689; and the fifth, 691. Since then the average has been 650 tons.

A number of problems which present themselves when a new system is started were encountered. We have found every detail must be given consideration, and that a record of the cause of delays is very helpful in operating efficiently. With this in mind, we have installed a recording voltmeter, connecting same in parallel with the conveyor starting push button. This shows the number and length of each delay for both shifts. The causes of the delays are written in the spaces on the chart when they occur.

I have previously referred to having the crews know what we were trying to accomplish. For the same reasons, we find it very beneficial to post a record each day showing the tonnage loaded by each crew and at the end of the week the average. We encourage rivalry between crews and find it very advantageous. We find the crews and foremen must realize the management is fully acquainted both with the daily results which are obtained and the cause of any drop in production. This is especially true with this system of mining in thin seams.

In conclusion, I am confident we will see continued progress and increased efficiency in thin seams with the shuttle car system of mining. Many fantastic ideas present themselves, yet some of these ideas will prove practical. In due time this system will enable the mines with thinner seams to compete with those having more favorable thickness.

Track Mounted Loading Machines, by **R. L. Adams**, Gen. Supt., Old Ben Coal Corp., W. Frankfort, Ill.

Since conditions vary widely in different coal fields, and between mines in the same field, we have a great variety of machines offered and used, intended to fit all these different conditions. The scope of standardization will always be limited for this reason. The word "conditions" in coal mining covers a great deal more than thickness of seam, character of roof and floor, overburden, etc. It may well include the general layout of the mine, ventilation, haulage system, haulage equipment and in fact all equipment.

Adoption of mechanical loading in most mines has been a gradual process. Few are in a position to do otherwise. Either the capital cost is too great or the necessity for uninterrupted production is too important; or the operator may from choice change over gradually to provide experience and time for adjustments in haulage, preparation and other equipment which are nearly always necessary. The selection of a loading machine is influenced by so many different things that we cannot enumerate them all.

The industry in Illinois [1928] had just gone through six years of hard times. There were no profits with which to buy the loading equipment that the new contract made desirable, yet the mine we have chosen as an example, together with many others, immediately began the installation of electric drills and pit car loaders or conveyors and the adoption of the scale of pay by the shift instead of by the ton. This resulted in numerous economies. Fewer working places were required—therefore, less track and timbering. Advantages of the larger, more powerful track mounted cutting machines were at once apparent, since two men could undercut almost twice as much coal as they did with shortwalls, and these were added from time to time.

The mine was now fully equipped with conveyor and track mounted cutters and the mining cycle was almost completely changed. The natural sequence was to further reduce the number of necessary working places by replacing the conveyors with standard loading machines. Since the mine was fully equipped with track mounted cutters, it was logical that the loaders should be track mounted also. Three of this type were put to work the first year (1935). Five more were added, one at a time, during the next four years until the eighth one made the conveyors no longer necessary. Normal production had been maintained, and displacement of men had been so gradual that the labor readjustment never reached an acute stage although a division of work still exists.

The combination of track loader and track cutter seemed logical from the first, and practice has proven it to be so. Serving the loader is still the greatest single factor in its performance, and in every system of coal removal from mechanical loaders we seek to reduce or eliminate delays to the loader from this cause. Using mine cars and locomotives, the best service is obtained when switches are used liberally and when separate storage tracks are available within the working area.

Tramming speed of track mounted loaders is important, and novices in the operation of loaders may give it no serious thought until they have worried with a loader having a 5 or 6 mile per hour high speed and a 150 ft. per min. low speed in a hilly section of the mine. This may be the "speed age," but it should be applied to loading machines with caution, and both high and low speeds should be so designed and built that they may be changed to fit varying conditions in service. The most satisfactory high speed in the mine in question is 3.2 miles per hour; and 70 ft. per min. is plenty fast for the slow speed. Experience with loaders equipped for 100 ft. per min. and those equipped for 57 ft. per min. in low shows much less wear on trucks and tramming clutch on the latter, and they are in high favor among the loader operators.

In the great variety of conditions found in the mines of this country, the track mounted loader fills an important place. The trend towards mechanization at the face is increasing as it must if the production of coal is ever to be a healthy industry. As more and more mines find ways and means to mechanize there will be less uncertainty and less hesitancy in the choice of equipment. Mechanical loading is no longer an innovation but a well established way of doing one of the big jobs in the production cycle. Better loading machines will be built, and many of them will be mounted on trucks to fit the track already there to transport the coal over the ever increasing distance between face and tipple.

Successful Pillar Recovery with Mobile Loaders, by **J. M. Connor**, Gen. Supt. of Mines, West Penn Power Co., Pittsburgh, Pa.

It is now generally acknowledged that those of us who wish to stay in the coal business are required to mine our product with some type of mechanical equipment. There has been a general feeling among some mining men that pillars cannot be successfully recovered with mobile loaders. It is not the purpose of this paper to attempt to tell you how to recover pillars mechanically but to show what has been done at several operations, in the hope that sufficient knowledge may be gained from the experience of those mines so that either some of those systems or modifications thereof can be applied to operations with different natural conditions.

Since most of our experience in pillar extraction has been at the Springdale Mine of the Allegheny Pittsburgh Coal Company, located in the Thick Freeport seam of coal, we will attempt to explain the methods used by neighboring operators and ourselves.

Successful pillar work requires the breaking of the Mahoning sandstone which lies about 15 or 20 ft. above the coal. This sandstone is from 25 to 40 ft. thick.

Pillar control lines can be placed on the working mine map so that they are always before the mine foreman and his assistants to see when his rooms and pillars are out of line. The distance between the control lines can be worked out mathematically so that each one will pass through the face of the next succeeding room. The success and operation of a successful pillar recovery system requires very close supervision and frequent measurements plotted on the working mine maps in the foreman's office.

Three different methods of drawing pillars will be described. First, the method used by the Wildwood Mine of the Butler Consolidated Coal Company, which is located in the western end of the Thick Freeport field; second, the method of pillar extraction used at the Renton Mine of the Union Collieries Company, located towards the eastern end of the Thick Freeport seam; and third, the method of drawing pillars at the Springdale Mine of the Allegheny Pittsburgh Coal Company, located towards the center of the Thick Freeport field. These three operations were selected because they mine all their coal with mobile loaders.

[Systems then described in detail.]

From these descriptions it may be noted that there is more or less flexibility to these pillar lines or any pillar lines; that is, this same principle can be worked out elsewhere to suit local conditions. The pillar line can be made steeper or may be flattened out by increasing or decreasing the area opened up before a fall comes, or by decreasing or increasing the room centers, or by a combination of both or either.

If it is possible to adhere to a well established system of pillar drawing under hand loading it is sometimes advisable to do this with machines, particularly in the beginning of mechanical mining, as so many other changes in methods must be worked out that it is generally inadvisable to make too radical a change in the system of pillar recovery. A great many coal operators have heretofore thought it unnecessary or impractical to draw pillars, but there is a possibility that at some future time, either by mutual cooperation or legislative requirement, all pillars as far as possible will have to be recovered. While it has been generally taken for granted outside of western Pennsylvania and northern West Virginia that pillars could not be recovered with mobile loaders, the examples of the three operations described above would indicate that if a proper approach is made towards this, pillars can be recovered successfully and at a reasonable cost.

Round Table Stripping Session

The 35 Cubic Yard Stripping Shovel, by **H. S. Richards,** Gen. Mgr., Tecumseh Coal Corp., Boonville, Ind. (Read in absence of author by **Forest B. Janeway,** Chf. Elec., Tecumseh Coal Corp., Booneville, Ind.)

In planning to work an acreage of this vast size, we were confronted with the problem of determining how we should operate it; that is, whether we should install a single large shovel or two smaller units. Considerable time was spent and a great deal of thought was given to the various phases of the problem, weighing the advantages and disadvantages of the various types, sizes, and designs of shovels applicable to this field. The result of the study convinced us that the proper stripping equipment should be a single large unit, with a 35 cubic yard dipper, and equipped with Marion's new knee-action front end, which would enable this large dipper to properly fill itself in relatively shallow overburden.

The average stripping shovel today is equipped with jacks that will allow it to level itself on a 10 percent grade, and due to the severe grades and pitches in our coal this was not considered enough. We have therefore provided for level on any grade up to and including 15 percent by installing jack cylinders and pistons on our machine which are longer than those on the standard shovel. The basic feature of the leveling device is the electric eye, which operates two high speed pumps instantaneously on every small change in grade. This keeps the shovel level within half an inch and equalized at all times.

In general and except for minor refinements, the electrical equipment on the 35 cubic yard shovel does not differ essentially from that of any of the modern large stripping units of the past few years. One desirable feature of the motor generator set is the use of two hoisting generators—one for each of the hoisting motors—instead of one generator for the two hoisting motors. This reduces the direct current voltage in the hoist motor circuits and on the whole is a more desirable arrangement than using a single generator.

Our shovel is also equipped with dual control stations—that is, one at the right and one at the left front corners of the upper frame and each station is equipped with duplicate controls to handle the operation of the shovel. The transfer of control from one station to the other is made easily and quickly by multiple-pole, double-throw switches located in the main cab.

The "knee-action" front end of our 35 cubic yard shovel is an entirely new design, and this is the first stripping shovel on which such a construction has been used. We feel that the development of this front end represents one of the distinct forward steps in the shovel building art and that it is probably the most outstanding development made since the application of crawlers to stripping shovels in 1925.

Because of the lighter front end construction, we are able to have a 35 cubic yard dipper on our machine when we could have only a 32 cubic yard dipper on a conventional front end. This increased dipper capacity enables us to handle a higher yardage per shift with a consequent decrease in the unit costs for stripping.

The maximum radius of clean-up on our shovel is 8 ft. more than the radius of clean-up would be if a conventional front end were used. This increased radius of clean-up is a valuable feature on any stripping shovel to assist in filling the dipper, and it is vitally essential on our shovel because of the amount of relatively thin overburden we have to move.

K. R. BIXBY
Chairman of the round table Session on Strip Mining

Now when we have to handle the thick overburden, the "knee-action" front end stands us in good stead, and here again the "floating" shipper shaft is a definite advantage. With it we can get not only a wide clean-up but a long dumping radius and a high dumping height.

The shovel has only been put in operation during the last week in April, and I am therefore unable to give you any operating data, yardage records, or any of the other more pertinent figures that I know would be of vital interest to you. I can say that the machine is now in operation and has not as yet developed any of what are commonly known as "bugs" of a serious nature.

Development of 80-Ton Haulage Trucks, by **L. Russell Kelce,** Vice Pres., Hume-Sinclair Coal Mining Co., Kansas City, Mo.

The past eight years have proved to us that if proper trucks are designed to meet each individual operation, it is a superior system in many respects to any other type of haulage for the transporting of strip mined coal to the preparation plant where the maximum length of haul does not exceed 5 miles in one direction or 10 miles round trip. For any distance beyond this, we feel that a combination of rail and trucks should be considered.

[Detailed description of experimentation in developing 40-ton and 80-ton units.]

This 80-ton truck has hauled since it started 238,826 tons of coal an average distance of 2.91 miles at an average cost of $.03453 per ton for all operating costs exclusive of depreciation, interest and overhead charges. The tire cost has been estimated at 10.8c per mile as the original tires are still on the tractor and trailer, and the estimate is conservative as we feel that we have underestimated the life of these tires. The depreciation charge should be based on not less than 5 years. The cost of this unit is approximately as follows:

Tractor	$15,000
Trailer	7,000
Total	$22,000
Depreciation per year	$4,400
Tons hauled per year	168,000

This makes a cost of $.026 per ton for depreciation, or a total cost of $.06053.

This unit has been satisfactory and has performed as we had planned. Again we have shown a reduced haulage cost, and proof of this statement is that the Dart Truck Company is now building for us two more units of the same capacity. These large capacity units not only save us on our operating costs, but it is cheaper to equip our mines with large modern units built to fit our own peculiar conditions than it is to purchase enough smaller units to haul the same daily tonnage.

We are firmly convinced that if you engineer your particular job and use a large capacity loading machine, the large capacity trucks will show a material saving over smaller units. In one instance it may be 50-ton units; in another 80-ton units, and I am not so sure that 100-ton units will not be available within a year or two, and if a unit of this size is properly designed and properly built to fit the conditions under which it is to operate, I believe it will prove to be the proper thing to do.

Armored Ground Cable for Transmission Lines—Part I, by **O. E. May,** Chf. Engr., Northern Illinois Coal Corp., Wilmington, Ill.

The merits of power transmission and distribution by means of armored cable, as applied to open pit mining, were first recognized by the Northern Illinois Coal Corporation in the summer of 1928. The company is engaged in mining the No. 2 coal seam by the strip method in Will and Grundy County, Illinois.

The management chose to install armored cable in spite of the higher initial cost, reasoning that the resultant saving in material and labor would make it more profitable in the end, and that the apparent adaptability of armored cable to pit operation would be a decided added advantage. Since armored cable was something entirely new to them at that time, some unexpected troubles were encountered, which were corrected as they appeared. The company has since developed its own methods of layout, construction of appurtenances, methods of handling and maintenance of this system.

They are at present using 38,000 ft. of armored cable for power transmission and have found so many advantages in its use that pole lines are never considered inside of pit areas, except for the primary purpose of conducting power to the pit transformers.

Most of the advantages of armored cable lead directly or indirectly to an increase of working time for the stripping and loading equipment, and since these two items are a large factor in the make-up of mine costs, it is through this added efficiency that the largest benefits are derived from the use of armored cable.

At the Northern Illinois Coal Corporation the economy of armored cable over a period of years cannot be questioned, when referred to mine costs. It costs very little more to make the initial installation, much less to operate, and has added to the efficiency of operation. The lower operating costs and added efficiency have far outweighed the small initial added investment.

Armored Ground Cable for Transmission Lines—Part II, by **J. C. Rettenmayer,** Chf. Elec., Northern Illinois Coal Corp., Wilmington, Ill.

It is within my province to install, maintain and repair the cable described by Mr. May, and I am going to present a few of the major problems with our solutions.

The cable is originally shipped in 1,000 ft. lengths, each of which, with its reel, weighs approximately 5 tons. An easy method of laying the cable is to mount the reel on a truck or trailer, and as the carriage moves along the cable loca-

tion, unreel it into place. If the nature of the terrain prohibits driving over the location the cable can be hauled as close as possible, and a tractor used to unreel and drag the cable into place.

After two or more lengths are in place, the power taps can be connected. The first power taps or junction boxes used were hurriedly assembled from stock parts and proved unsatisfactory; but subsequent changes and improvements have developed a unit which is adequate and safe.

To avoid sharp bends and kinks when moving the cable laterally, a team or tractor is hitched to the cable through a device resembling a snatch-block. It is made from light angle rolled into a circle with spokes welded in to form a large light weight sheave which is mounted on a suitable frame.

The job which is most surely to run into overtime is that of cable splicing. This is a case where a careless tractor driver or shovel runner can do damage in a few minutes that will take hours to repair. It has taken several years and numerous repairs to develop a splice that is satisfactory. While splicing is largely a matter of personal skill, yet there is a certain procedure that facilitates a good neat job. The cable is cut in two and the armor carefully unwound for 12 to 15 ft. on either side of the splice. The conductors are then butted and brazed, cabled and taped, the armor laid back in place, carefully butted and finally brazed.

The Carry-All Scraper As An Auxiliary Stripping Unit, by T. G. Gerow, Chf. Elec., Truax-Traer Coal Co., Chicago, Ill.

The use of the carry-all scraper outfits at the Truax-Traer Coal Company mines was prompted by the need of advance preparation of box cuts in heavy overburden. Past experience had proved the high cost and trouble encountered in trying to force box cuts into depths over the normal range of stripping shovels. Even at properties where the dragline tandem outfit was in operation, the use of the dragline on top, ahead of the stripping shovel, was only partially satisfactory. Box cutting was slow and costly; and where the dragline was used ahead, its normal coal production was lost for the period of the cut.

[Detailed description of scrapers and tractors at various properties of the company.]

Although the subject has been largely confined to auxiliary stripping, there are a number of uses well worth mentioning without explanation, at this time. The following is an attempt to list the more important applications:

Stripping Auxiliary Uses:

1. Skimming operations, or general reduction of overburden over a given box cut area.
2. Box cut preparation in heavy overburdens.
3. Cutting through heavy peaks or ridges.
4. Extending the life of an operating pit by reducing heavy overburdens over a portion of the cut.
5. Actual assistance on heavy overburdens, using either the dozer or carry-all to rehandle a part of the overburden spoiled by the shovel.
6. The dozer as a clean-up unit in the pit working with the larger stripping shovels.

Pit Uses:

1. Cleaning up slides.
2. General clean-up work ahead of loading shovel.
3. Assistance in emergencies, such as snow removal or mud removal caused by floods, etc.
4. Road building.
5. Has been proposed as a loading and haulage unit on thin coal.
6. A multitude of uses as a dozer unit.

Construction and Maintenance:

1. Road building.
2. Reservoirs and dams.
3. Drainage and ditching.
4. Runway and ramps.
5. New construction work of all kind requiring excavation or fill.
6. Assistance to strippers moving overland and many emergency uses.

Although our early experience was obtained with the "70" gasoline tractor and 8-yard scraper, our trend is definitely towards the heavier "D-8" Diesel type and 12 or 13-yard scraper for heavy construction or stripping use. We consider a complete unit, a tractor, straight bulldozer and carry-all scraper. For pit work and general utility, we prefer the lighter "D-6" Diesel machine equipped with a dozer.

To give some idea of the extent to which our company uses the carry-all outfits, we are now operating at our three Illinois mines two "70" gasoline Caterpillar tractors, two "D-8" Diesel Caterpillar tractors, all equipped with straight bulldozers, and three 8-yard Le Tourneau carry-all scrapers. The "70" tractors and 8-yard scrapers are all original equipment dating back to 1936-37. In North Dakota, we are equipped with one "D-8" Caterpillar tractor and 13-yard Le Tourneau carry-all scraper. The tractor is also equipped with a straight bulldozer. At our Canadian operation, a 6-yard Le Tourneau carry-all scraper is used with a "D-6" Diesel Caterpillar tractor. Here the "D-6" and dozer is the regular pit equipment and the carry-all an auxiliary to it for use in construction work, etc.

The "D-6" type tractor and bulldozer is standard pit equipment at each of our seven strip mines. All new tractor equipment for some time has been Diesel powered, the operating cost being considerably lower than with gasoline powered units. To date, our experience has been very good on Diesel maintenance costs.

We feel that our experience over the past four years has definitely proved the value of the tractor-scraper-bulldozer outfit as a stripping auxiliary unit. It is economical, extremely mobile, and seems to have almost unlimited uses. It's almost like the cutting torch and arc welder; we wonder how we ever operated without them.

Indicative of the keen interest of stripping operators was the crowd which listened attentively to, and discussed enthusiastically all papers presented at the round table Session on Strip Mining

National Economic Problems

Doctor Or Wet Nurse? by E. C. Payne, Consulting Engineer, Consolidation Coal Co., New York, N. Y.

You gentlemen in the production end of the industry are endeavoring to cut costs per ton in fractions of a cent. These tons are then turned over to the salesmen, and I feel sure that you believe they are throwing away nickels and dimes with every ton they sell in the vicious competition that they encounter in marketing the coal. The mills which you save enable salesmen to make lower prices, and the competitive prices which they require necessitate further reductions in production costs to minimize the losses. All departments of the coal business get a little dizzy racing around this vicious circle in search of a profit.

Our inability or unwillingness to discuss our mutual problems around the conference table and reach an amicable solution voluntarily has forced upon us an "armistice," the terms of which we are now anxiously awaiting. Fixed minimum prices established under the Bituminous Coal Conservation Act of 1937 will soon be published; and the freedom of action which we have always enjoyed in the marketing of coal will soon be curtailed.

The bituminous coal industry has suffered substantial losses to competitive fuels such as oil, gas, and hydro-electric power, and I believe that much of the responsibility for these losses rests on our own shoulders. We have given little concern as an industry to the way in which our products are consumed, or the uses for which our products are suitable.

During the past 20 years we have concentrated on volume production and volume sales, with little thought about the development of equipment for economic utilization and the production of low cost steam. The combustion equipment of many of our good customers has been approaching obsolescence, and we have permitted our energetic competitors who sell oil and gas equipment to replace this obsolete equipment with modern steam generating units which would show substantial savings with the use of oil and gas over the obsolete coal burning equipment. Our customers did not realize that the latest developments in coal burning equipment would show still greater savings through the use of cheaper grades and sizes which were not suitable on the old equipment. This sleepy sales policy has lost us a lot of business, all because we took very little interest in the development of modern combustion equipment to burn the sizes and grades of coal that were consistent with our production needs.

I believe that we should revise our attitude toward utilization and devote more time and money to the development of better combustion equipment to burn coal in its more natural state, so that there would not be this necessity for super-preparation. The average modern steam generator, fired with the latest in stokers or pulverized fuel units, was not developed through any cooperative research between the coal industry and the equipment manufacturer. We have stood idly by while outside interests have

R. E. SNOBERGER
Chairman of the Session on National Economic Problems

thrived by making machines to burn coal; but as a usual thing these equipment developments gave no thought to the utilization of coal which could be produced at low cost.

The coal industry has made no effort to tell the consumer, the designing engineer, or the equipment manufacturer where the best fuel values are for each market, and as a consequence hundreds of industrial plants contain equipment combinations which are entirely unsuitable for the best fuel values available in that particular market.

Instead of devoting some of our time and money to the development of combustion equipment to suit our needs, our industry has attempted to broaden its markets by making hundreds of sizes and size combinations in order that they might be acceptable on various installations of combustion equipment.

It is my considered opinion that we have been spending the last 10 years acting as a wet nurse to the average piece of apparatus which has been developed to burn coal. With some of this wet nurse experience myself, it occurs to me that possibly we are catering to the wrong end of this alimentary canal of coal utilization.

Instead of revamping these natural products to fit the machine, why is it not feasible to utilize the natural product—of course giving every consideration to basic costs and basic values in order that we may carry this job of digging coal through to a conclusion. We have been varying the diet now for 10 years and our wet nurse job continues. I would recommend a doctor's diagnosis of this problem, so that we can pick up the stethoscope and get to the heart of the problem of redesigning the utilization machine for a wider range of applicable coals and by so doing, we will be able to throw away the "rubber pants" of super-preparation.

The doctor's diagnosis will probably require that we continue the modernization of our production methods at the mines until the BTU "vitamins" of bituminous coal, which are the measure of heat value, are produced at the lowest cost; and following this we must establish economic limits on the cleaning, sizing and preparation program on the tipple. Any money spent at this point increasing the production cost which is not justified by the sales return for the improvements accomplished, should eventually be discontinued.

In my concluding remarks, I would suggest cooperative action among groups of producers with similar coals and similar production and marketing problems for the promotion of their natural advantages, whether they be in low cost, adaptability of their coals to certain uses, extensive resources, or low transportation costs to industrial markets.

National Legislation Affecting Coal Mining, by **Julian D. Conover**, Secretary, American Mining Congress, Washington, D. C.

[Address carried in full on pages 16 to 21 of this issue.]

Safety

Trends in Reducing Hazards in Mechanical Mining, by **L. E. Young**, Cons. Engr., Pittsburgh, Pa.

Some months ago the chief of the Health and Safety Branch of the United States Bureau of Mines said in a public address at Pittsburgh, "There is good reason to believe that when our coal-mining people face the fact that mechanized methods have new and serious hazards (even though they may eliminate others), and then seriously investigate the nature of those hazards and institute and maintain available remedies, the mechanization of our mines will ultimately result in materially reduced occurrence of accidents and also in reduction in all accident rates, whether based on an exposure or on a production basis."

With this frank and optimistic statement most of us will agree, although there may be a difference of opinion as to the extent to which the use of mobile loaders, conveyors, scrapers and pit-car loaders has introduced new and serious hazards in all coal fields.

In many fields of the Middle West the rate of car change per gathering locomotive in hand-loading sections was as high prior to the advent of mechanical loading as in the best mines using mobile loaders today, and the hazards in haulage have not been increased. It is also true that the hazards of operating shortwall cutting machines are no greater, and probably less, than in the days of hand-loading in these same coal fields.

Relatively only a few employes are engaged in the operation of loading coal. For one or two men employed on a mechanical loading device there may be a crew of 10 to 20 men on the section doing the same kind of work that day men have always done in coal mines—and these 10 to 20 men are probably subjected to just the same hazards to which they have always been exposed in performing the respective classes of work.

It is suggested that we classify the hazards and give specific causes and remedies for each. All of the hazards of course do not exist in all mines in all districts. The causes of hazards may differ from mine to mine and from time to time during the life of a mine, but a few general statements may stimulate our thought in examining the problem.

I. What are the hazards introduced by mobile loaders, conveyors, scrapers, and pit-car loaders?

Listing those commonly mentioned, and in no particular order, they are: (1) increased hazard for explosive gas; (2) increased hazard from coal dust—both dust in the atmosphere and accumulations at the face and in other portions of the mine workings; (3) roof hazards, due to increased spans and necessary clearances, and noise; (4) electricity and more extended use of electric machinery, cables, wires, etc.; and (5) human element, (a) more men in a small section, and (b) failure of men to be alert on the job.

II. What are the causes of the hazards that are introduced by the use of mobile loaders, conveyors, scrapers, and pit-car loaders?

1. Rapid Advance. The rapid advance of entries into solid coal in gassy mines results in much more serious gas problems than occur in hand mines where the rate of advance is generally much slower.
2. Concentration. While this has been referred to as a hazard, these specific dangers can generally be avoided if proper precautions are taken, including systematic timbering, the use of permissible equipment, and shooting with permissible explosives by properly qualified shot-firers.

On the other hand, concentration permits better supervision, better venilation, better maintenance of roof; in general, the advantages greatly outnumber and outweigh the disadvantages.

3. Dust. The remedies must obviously fit the specific causes.
4. Dangerous Roof Conditions.
5. Clearance.
6. Moving Parts.
7. Cables and Electricity.
8. Areas Standing after First Mining.
9. Human Element.

The use of mechanical loading devices has introduced some new hazards and it has reduced, if not eliminated, some old ones. The causes of these new hazards are evident, and remedies can and should be devised and applied with the most rigid discipline.

In general, the Operator must take the full responsibility for meeting these hazards. The mining laws of certain states and the traditional management clause of the wage agreement impose upon the Operator the right of management, without abridgement or interference from any source whatsoever.

The Operator must accept full responsibility without qualification and must see

I. N. BAYLESS
Chairman of the Session on Safety

to it that necessary steps are taken to provide for the old and the new hazards—he must provide adequate ventilation for working places and gobs; he must enforce rigid discipline in handling and using explosives of the proper character; he must require unfailing care in the operation and maintenance of electrical machinery; he must insist on systematic timbering at the working face; he must prevent dust hazards throughout the mine and especially at the working faces; he must see to it that devices and guards are installed and maintained to protect the worker from moving parts, machinery, and electric hazards; and he must see that the Mine Worker wears protective clothing and goggles.

Cooperation of the Mine Worker is

necessary and must be secured. Various methods may be followed in winning and holding the interest of employes. A number of schemes and methods have been devised and results speak for themselves.

The outstanding success of many Operators using mechanical loading devices shows what can be accomplished. The experience of these Operators can serve well to help in meeting and overcoming hazards incidental to the use of mechanical loading devices.

Accident Sources and Overcoming New Hazards, by **L. A. Hill,** Asst. Supt., Chicago, Wilmington and Franklin Coal Co., Orient, Ill.

During the 55-year period from 1882 to 1937, 7,005 men were killed in and around the coal mines in Illinois. Of this number nearly 92 percent were killed underground, 5 percent in the shaft, and 3 percent on the surface. Of the fatalities underground 51 percent were killed at the working face by roof falls, ribs and face coal; 18 percent by haulage; 10 percent by handling explosives; 9 percent by explosions; 2 percent by electricity and 10 percent by other means. Of these different causes of fatalities, there is one more terrifying than all others, the one we all fear the most, and the only one, broadly speaking, that the general public ever hears of—the mine explosion. It accounts for only 9 percent of the total, yet the circumstances which surround this type of accident, and the fact that considerable numbers of men frequently lose their lives in each explosion, causes the layman to associate coal mining synonymously with mine explosions.

The number of explosions and fatalities therefrom caused by explosives has been exceeded only by those caused by open lights and smoking. The use of black powder in solid shooting has accounted for two-thirds of all explosions of this type, however, this cause has almost disappeared as mining laws in most states do not now permit "shooting off the solid." Permissible powder has to a great exent supplanted black powder, although at higher cost, and is now in aggressive competition with the various forms of carbon dioxide and air dislodgment, and hydraulic pressure. A worthy recent development in the permissible powder is the sheathed stick, which is a tight-fitting cylinder composed of a compressed mixture of salt and soda with a small but sufficient amount of binder, which envelops the powder stick except at the ends. The manufacturer claims almost entire elimination of flames, fumes and smoke.

The most positive insurance against mine explosions is sufficient and uninterrupted ventilation coupled with good rock dusting.

The real hazard of underground mining is the fact that 51 percent of all coal mine fatalities are the result of falls of roof, face, or ribs. The advent of mechanical loading has materially reduced this figure of 51 percent, although this new method has brought with it some new hazards. However, the change has been very beneficial from an accident reduction standpoint.

At our New Orient mine a comparison of accidents at the working face between hand loading during six winter months of 1927-28, and mechanical loading during six winter months of 1929-30, in the same section of the mine, with approximately the same tonnage produced, and same number of days worked, with a reduction in working force of 42 percent, shows a reduction of 68 percent in number of accidents, and an increase in tonnage per accident of 190 percent.

Our Orient No. 1 Mine operated under hand loading until 1929. During the previous four years the accident frequency rate averaged 252. During the next three years mechanical loading was slowly introduced and 16 percent of the tonnage was loaded by mobile loaders. The A F R dropped to 169 for the period. From 1932 to 1934, inclusive, followed another period of transition in which all coal was loaded mechanically, but 68 percent of the tonnage was loaded by mobile loaders and 32 percent by pit car loaders. The A F R again dropped from 169 to 119. From 1935 the next five years operation was 100 percent loading machines and A F R has averaged 66.

Successful accident prevention can only be obtained by starting at the top of an organization and working on down to the bottom. Everyone must be sold on the idea. It is strictly a management responsibility.

Men are natural gamblers and will take unnecessary risks. Negligence is an ever present liability in mining. Some men are accident prone on certain jobs, and when this condition becomes evident they should be changed to other work. Accident costs are the most unpopular figures on the cost sheet, not only to the company, but to the men and, aside from the cost to the company, the humanitarian aspects are, of course, a primary consideration.

Leaders of American Mining Congress coal activities turned out en masse for the Coal Division dinner Tuesday night

SESSION CHAIRMEN

The smoothness and dispatch with which all session programs were conducted was brought about largely through the efficient manner in which the Chairmen of the eight sessions presided. With the assistance of the Floor Committee, headed by Wesley S. Harris, president, Bicknell Coal Company, they succeeded also in developing a wealth of valuable discussion from the floor.

Distinguished mining men who thus contributed their services comprised: *Ernest B. Agee,* supt., Youngstown Mines Corporation; *H. L. Richardson,* vice president, West Kentucky Coal Company; *Byron M. Bird,* chief concentration engineer, Battelle Memorial Institute; *Robert G. Pfahler,* mining engineer, The Berwind-White Coal Mining Company; *P. L. Donie,* vice pres., Little Betty Mining Corporation; *C. J. Sandoe,* vice pres., Perry Coal Company; *K. R. Bixby,* gen. mgr., Midland Electric Coal Corporation; *R. E. Snoberger,* president, Binkley Coal Company; and *I. N. Bayless,* gen. mgr., Union Pacific Coal Company.

COAL DIVISION DINNER

On Tuesday evening, April 30, members of the Coal Division of the American Mining Congress, including many of its Advisory Council and Board of Governors, gathered together for dinner to discuss informally problems facing the industry and activities of the Division designed to aid in solving them. Some 75 leading coal men and manufacturers were in attendance.

R. L. Ireland, Jr., Chairman of the Coal Division, presided as toastmaster, and added a full measure of enthusiasm and wit to the festivities.

Brief talks, complimenting the work of the Coal Division as an outstanding service to the coal industry, were presented by the following: Harry Moses, National Chairman of the Program Committee; Frank Mueller, Chairman of the Manufacturers Division; A. S. Knoizen, incoming Chairman of the Manufacturers Division; E. J. Newbaker, vice president, The Berwind-White Coal Mining Company; George B. Harrington, president, Chicago, Wilmington & Franklin Coal Company; W. J. Jenkins, president, Consolidated Coal Company, and George S. Rupp, manager of mines, Colorado Fuel and Iron Corporation.

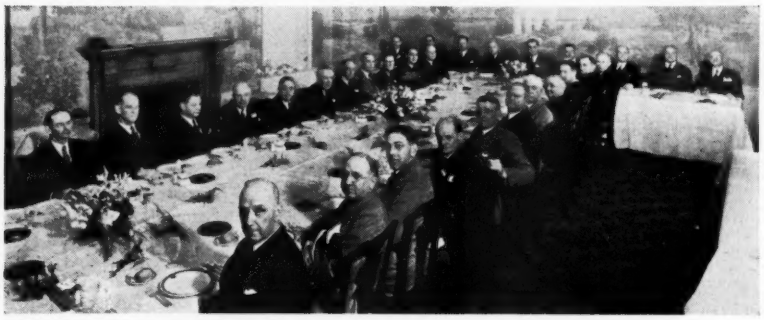
BOARD OF DIRECTORS MEETING

The luncheon meeting on May 2 included as guests of the Board a number of officers of coal companies and also of manufacturing enterprises which furnish equipment to the industry.

Under the Chairmanship of President Howard I. Young the meeting received the reports of the following Committee Chairmen: Erle V. Daveler, Finance; Henry B. Fernald, Tax; Herbert Wilson Smith, Social Security; and Samuel H. Dolbear, Securities & Exchange Commission, Cooperation. The work of the Congress in the present year was described by Secretary Conover, including a resume of Washington legislation as well as references

to Federal Departmental activities affecting mining.

Board members and guests presented their views on the results of the convention and the prospects which lie ahead for manufacturers and the operators of mining properties in a mutually constructive program. Coal Division Chairman R. L. Ireland, Jr., made pointed reference to the tremendous amount of retooling which lies ahead for coal mining enterprises, and stressed the fact that this can best be accomplished by the closest cooperation between operators and manufacturers under the leadership of the American Mining Congress. Messrs. Robert S. Palmer and George Rupp of Colorado extended a cordial invitation to those present to attend the Western Division Metal Mining Convention and Exposition in Colorado Springs September 16-19, and Mr. Rupp pointed out the strength of the small miners of the West in supporting the welfare of mining in national matters. In closing the meeting President Young stressed the obligation upon business men to remember what can be done at home to improve operating conditions in the broadest sense, with particular emphasis on the fact that "there is only one way to put men back to work and that is to get more wheels rolling in productive industry."



Luncheon meeting of A. M. C. Board of Directors

ENTERTAINMENT

The tops in entertainment for each evening function was arranged by the Entertainment Committee under the enthusiastic and capable leadership of John W. Haddock, vice president, Sullivan Machinery Co.

So popular was the King Coal Club in the Netherland's Pavillon Caprice on Monday and Tuesday that its facilities were taxed to the utmost to provide dinner service to guests. Two fast-moving floor shows, with plenty of side-splitting comedy, featured each of these evenings.

On Wednesday night convention-goers were given a special treat in the Hall of Mirrors, with a full card of ten boxing bouts between Golden Gloves fighters from coal camps throughout the country. The boys really meant business and were in there fighting furiously every minute. Many fans remarked enthusiastically that it was the best amateur card they had witnessed.

A list of the fighters, together with the coal companies they represented, and the winners, are as follows:

BANTAMWEIGHT

Dick Daly, Gillespie, Illinois. Representing Superior Coal Co.
Johnney Osborne, Ameagle, W. Va. Representing Peabody Coal Co.
Winner: Osborne, by decision.

FEATHERWEIGHT

Robert Chance, Taylorville, Ill. Representing Peabody Coal Co.
Joseph Oliverio, Rivesville, W. Va. Representing Consolidation Coal Co.
Winner: Oliverio, by TKO in 3rd round.

LIGHTWEIGHT

Jesse Paul Jenkins, Christopher, Ill. Representing Old Ben Coal Corp.
John Andrew Chizmar, Algoma, W. Va. Representing Algoma Coal & Coke Co.
Winner: Jenkins, by decision.

WELTERWEIGHT

Jack Rowsey, Ashland, Ky. Representing Big Sandy-Elkhorn Coal Operators Assn.
Clarence Rogers, Highcoal, W. Va. Representing Anchor Coal Co.
Winner: Rogers, by TKO in 2nd round.

HEAVYWEIGHT

Frank Colombo, Dawmont, W. Va. Representing Dawson Coal Co.
Paul Ladika, Jasonville, Ind. Representing Linton-Summit Coal Co.
Winner: Colombo, by decision.

FEATHERWEIGHT

Phil Brown, Gillespie, Ill. Representing Superior Coal Co.
Dave Manzanares, Denver, Colo. Representingg Rocky Mountain Fuel Co.
Winner: Brown, by decision.

MIDDLEWEIGHT

Mike Janoski, Bradley, Ohio. Representing United States Coal Co.
Fred Williams, Kayford, W. Va. Representing Truax-Traer Coal Co.
Winner: Janoski, by decision.

MIDDLEWEIGHT

Marion Klingensmith, Brownsville, Pa. Representing H. C. Frick Coke Co.
John McMillan, Benton, Ill. Representing Chicago, Wilmington & Franklin Coal Co.
Winner: Klingensmith, by decision.

LIGHT HEAVYWEIGHT

Ezra Gooderham, Ashland, Ky. Representing Big Sandy-Elkhorn Coal Operators Assn.
Tiz Jones, Highcoal, W. Va. Representing Anchor Coal Co.
Winner: Jones, by decision.

HEAVYWEIGHT

James Neale, Highcoal, W. Va. Representing Anchor Coal Co.
Charlie Duncan, Terre Haute, Ind. Representing Binkley Coal Co.
Winner: Duncan, by decision.

Each of the winners received handsome Gruen gold wrist watches. Klingensmith was judged the best boxer in the show, and also received a portable radio for his fine showing.

Van B. Stith, superintendent of mines, Anchor Coal Company, was Chairman of the Boxing Subcommittee in charge of this event. Mr. Stith also served as announcer and ran the bouts off with clock-like precision.

Following the fights on Wednesday night guests were treated to another stellar floor show in the King Coal Club.

The annual banquet on Thursday night in the Hall of Mirrors climaxed the week's festivities. Following a delicious dinner, toastmaster Darius A. Thomas, president of the Montevallo Coal Mining Company, introduced Mayor James G. Stewart of Cincinnati, who really "rang the bell" with his rousing welcoming talk, chock-full of humor—which was received so enthusiastically by the crowd that he repeatedly had to stop until the cheering and applause subsided.

Distinguished mining men at the head table were then introduced by Mr. Thomas, after which an excellent floor show was presented, featuring sleight-of-hand by Giovanni, world's cleverest pickpocket; captivating songs by Judy Starr, and stirring harmony by the Eight White Guards. Sid Page kept the ceremonies moving as "speaker of the house."

Featured during the week were the beautiful and talented Dorothy Byton dancers, under Miss Byton's personal direction; and fine orchestral performances were turned in all four nights by Jimmy Van Osdell's band.

All entertainment features for the four nights were booked through the Chicago office of M. C. A. Artists, Ltd., and Eddie Elkort of that organization made them "click" by his own supervision over the entire program in Cincinnati.

LADIES' ENTERTAINMENT

Special entertainment during the days for the many visiting ladies opened on Monday with a get-acquainted luncheon in the Restaurant

A delightful feature of the special ladies' entertainment was the Bridge Luncheon at the Hamilton County Country Club

Continentale, followed by an interesting trip through the Coca-Cola bottling works. A bridge luncheon was held Tuesday at the beautiful Hamilton County Country Club, and on Wednesday about 45 of the ladies embarked in de luxe coaches for an all-day trip to Kentucky's famous Blue Grass country near Lexington. Mr. and Mrs. A. E. Bendelari were hosts at cocktails preceding luncheon at the Lexington Country Club, after which visits were made to several of the world's renowned stables in the vicinity.

THE EXPOSITION

The Exposition so completely filled all available space in Music Hall, including a double row of booths in the foyer, that new arrangements for registration had to be made in the outer hallway. The entire show was enthusiastically acclaimed by both operators and manufacturers. Not only was attendance at the exhibits better than ever before, but more active interest was displayed by operators in studying the manufacturers' wares, and in seeking detailed explanations of the functions and attributes of equipment and supply items. And the exhibits themselves probably covered a more complete range of mining items, and were more attractively displayed, than at any show in the past. Through the fine cooperation of 150 of the leading mining manufacturers, the 1940 Exposition was in every sense a splendid credit to the coal mining industry.

Detailed descriptions of the exhibits were carried in the April issue of the JOURNAL, and will therefore not be repeated. Cutting and loading machines, underground conveyors, rubber-tired shuttle cars, mine locomotives and cars, fans, drilling equipment and air compressors led an array of mining equipment ranging from these complete and operating units to replacement parts, blasting accessories, track tools and materials, welding equipment, bearings, lubricants and a host of miscellaneous shop items. Specialists in coal preparation found all types of modern screening equipment and screen materials, cleaning and conveying units, and coal treating materials. A full line of items available for insuring protection of workmen and the safe operation of coal mines was displayed by companies specializing in safety equipment. Suffice it to say

Above: A typical view of exhibits on Convention Floor. Meeting room is at right

Above: Looking down the center aisle of South Hall exhibits

Right: View of Jeffrey Manufacturing Company's display in South Hall

General view of exhibits in North Hall

that there was scarcely a single item used in modern mining and preparation of coal that was not on display or that could not be supplied by companies exhibiting.

The annual meeting of the Manufacturers Division of the American Mining Congress was held on Monday, April 29. A. S. Knoizen, vice president of Joy Manufacturing Company, was elected to serve as chairman of the Board of Governors for the coming year, succeeding Frank E. Mueller, Roberts & Schaefer Company. Other officers elected were as follows: E. J. Burnell, Link-Belt Co., first vice chairman; E. F. Carley, E. I. du Pont de Nemours & Co., Inc., second vice chairman; and J. W. Haddock, Sullivan Machinery Co., third vice chairman.

Arrangements had been completed to hold the 1941 Coal Convention and Exposition in Cincinnati, April 28-May 2, and these arrangements were enthusiastically approved by the Division.

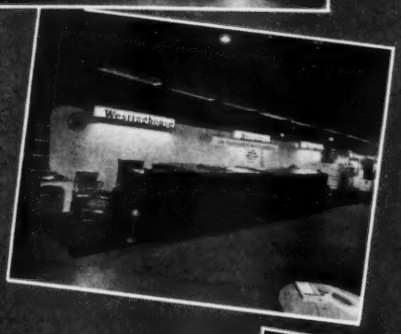
Members elected to the Board of Governors included the following: P. H. Grunnagle, Westinghouse Elec. & Mfg. Co.; A. S. Knoizen, Joy Manufacturing Co.; V. J. Nolan, Union Carbide & Carbon Co.; John T. Ryan, Mine Safety Appliances Co.; J. J. Huether, General Electric Co.; H. H. Bullen, American Steel & Wire Co.; Wm. E. Goodman, Goodman Manufacturing Co.; and H. V. Brown, Brown-Fayro Co.

Other members of the Board are as follows: E. J. Burnell, Link-Belt Co.; E. F. Carley, E. I. du Pont de Ne-

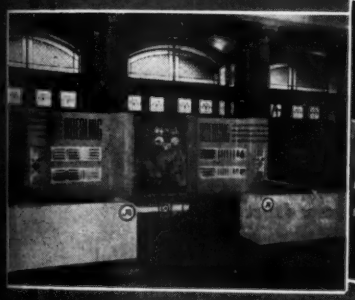

UNITED STATES RUBBER COMPANY


MINE SAFETY APPLIANCES CO.

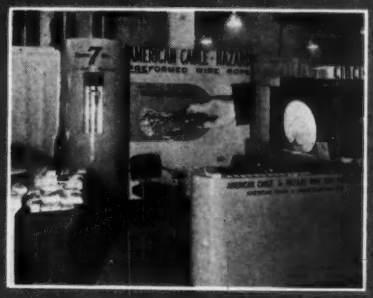

ATLAS




BIXBY-ZIMMER SCREENS

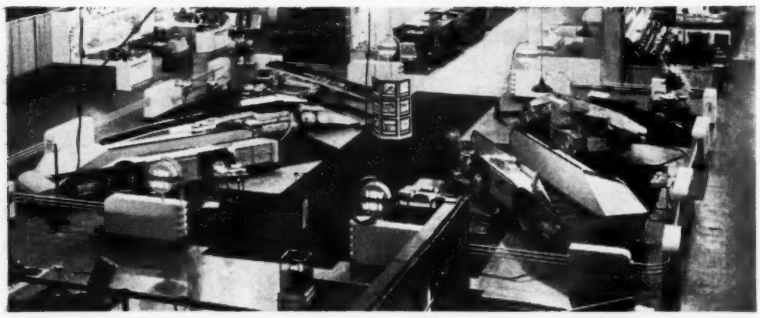



GE DC MOTORS and CONTROL
GENERAL ELECTRIC




TALCOTT BELT FASTENERS

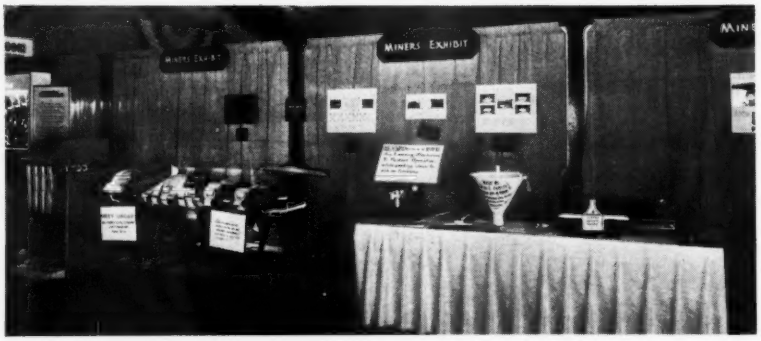

FLASH



Left: Shuttle cars and coal loaders featured the exhibit of Joy Manufacturing Company in North Hall

Below: Just a few of the interesting gadgets which again attracted crowds at the Miner's Exhibit on Convention Floor

mours & Co., Inc.; R. L. Cox, Jeffrey Manufacturing Co.; J. W. Haddock, Sullivan Machinery Co.; Frank E. Mueller, Roberts & Schaefer Co.; G. E. Stringfellow, Edison Storage Battery Co.; Charles C. Whaley, Myers-Whaley Co.; and J. C. Wilson, Ohio Brass Co.



A. S. KNOIZEN
Newly elected Chairman of the Manufacturers Division

MINERS' EXHIBIT

The inventive genius of coal mine employes was again on display at the Miners' Exhibit, comprising a sizable area on the convention floor. This feature again proved to be an ace attraction of the Show, and much of its success is due to the work of the Miners' Exhibit Committee under the chairmanship of A. W. Hesse, chief engineer, Buckeye Coal Company.

Gadgets ranging from metal shin guards through car rerailers and skids to sand scoop and dummy cartridge machine, numbering in all about forty devices, attracted crowds of interested spectators all week.

Prizes of $10 each were awarded for the following exhibits:

Sand Scoop, by Jesse Farley, West Virginia Coal and Coke Corp.

Cable Suspension, by H. J. Kinsman, Franklin County Coal Corp.

Dummy Cartridge Machine, by F. M. Kilfoyle, Spring Canyon Coal Co.

Grease Bucket, by E. L. Swanson, Colony Coal Co.

Shaft Guide Lubricator, by Peter P. Kuncis, Boulder Valley Coal Co.

Re-Railer Switch, by Allen Ewing, Dawson Daylight Coal Co.

Automatic Locking Drill Chuck, by Noah Thomas, Weirton Coal Co.

Loading Machine Guard, by George Stacey, Harwick Coal & Coke Co.

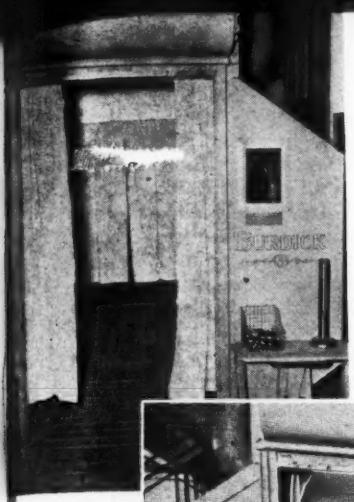
Battery Rack, by A. D. Neal, and J. H. Kuehner, Consolidated Coal Co.

Locomotive Safety Coupling, by D. R. Richardson, Union Collieries Co.

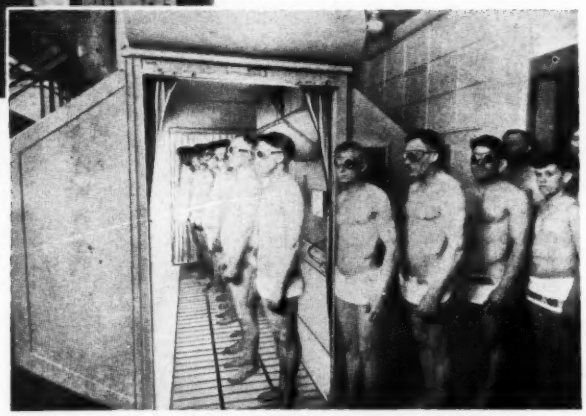
Detailed descriptions of these exhibits will be carried in the 1940 Yearbook on Coal Mine Mechanization.

Chairmen of other sections of the Arrangements Committees responsible for importants parts in the development of the 1940 Coal Show included T. J. Thomas, president, Valier Coal Company, Attendance; Louis J. Ott, manager, Advertising Department, Ohio Brass Company, Publicity; and R. H. Morris, general manager, Gauley Mountain Coal Company, Welcoming.

Cutters, loaders and conveyors were included in the Goodman display in North Hall. Sullivan exhibited cutters, scraper loader, compressor and other items in the room in rear of above picture



Bringing Sunlight To Coeur d'Alene Miners



Upper left: View of Bunker Hill and Sullivan's Solarium, and (below) group of workers being carried through

● ***Solaria Installed At Mine and Smelter of B. H. & S. Found Effective In Combating Colds and Pneumonia In Mountainous Area With Little Winter Sunshine***

By STANLY A. EASTON
President
Bunker Hill & Sullivan Mining & Conc. Co.

OUR community is situated in a narrow, deep valley. At this latitude, and because of prevailing overcast weather, little sunshine reaches us during the winter months. This circumstance, coupled with the fact that most of our employes work underground, results in their getting very little or no natural sunshine for several months in the year.

The late George Kennett, M.D., who had charge of our local hospital for many years, was a strong advocate of the therapeutic value of ultra-violet rays. Especially during the fall and winter months his lamp at the hospital was going pretty continuously. These treatments were necessarily limited to a few, because they required the constant attention of a nurse with a stop watch to prevent burning, and were too costly for many persons who would have profited by such treatment. The results which Dr. Kennett secured by use of the lamp, especially on children, were so impressive that we determined that an automatic solarium would be installed and made available to our employes and local people.

Notable Benefits Cited

Repeatedly I have been asked to report what good has been accomplished in the ten years of our experience. Such results, while undoubtedly good, are difficult to express statistically; especially in the case of adults. School children are brought to the solarium in the school bus in large numbers. Superintendent of Schools John Booth has caused to be kept a record of time lost by the school children on account of illness. He reports to me that the children who have taken the solarium treatment regularly show far less loss of time than those who take it irregularly or not at all. The school nurse reports the same thing, and also that the solarium is almost a specific in the case of eczema and other skin ailments, in improving anemic children and those who lack appetite and natural vigor.

Adults who take the solarium treatment regularly report in most instances entire freedom from colds and, almost universally, much lighter colds when they do become afflicted. A matron has charge of the solarium for 2 hours each morning for the use of the women and girls, from whom we have similar reports.

Pneumonia is often prevalent during the late winter months, and in some years fatalities are high; records show that during the ten years there has only been one death from pneumonia by a regular user of the solarium, the victim being an old man in poor physical condition generally. Some users of the solarium have had pneumonia, but in a light form.

The solarium is so well regarded by our people that we were petitioned to put one in at the smelter for the greater convenience of the employes at that plant, which is somewhat remote from the mine. This installation was recently completed and is already being used by a large number of our employes at the smelter and by their families. We give about 7,000 treatments a month from October until May. I might add that my own experience largely confirms the foregoing. I take the solarium treatment regularly and am practically free from colds, or any other ailment for that matter.

The use of the solarium is optional and is confined principally to our underground employes for whom it is most convenient.

Equipment Details

The original solarium with the cabinet contains six 110-volt quartz Mercury Vapor lamps, 3 lamps mounted on each side of the conveyor arranged to give uniform radiation, each lamp provided with automatic starter, standard voltage regulator and voltmeter; the conveyor or escalator moves through the cabinet from one end to the other, requiring one minute to travel through the cabinet—therefore there is insufficient exposure for burning.

At the mine change house, where

the solarium is located, the men remove their working clothes, take their shower, and ride through the cabinet about three times a week, put on their street clothes and go home. The operation is relatively inexpensive and is directed by a part-time employe who, because of age and infirmity, is unsuited to heavier work. The new solarium at the smelter is equipped with a moving rail which leads the person through the lights at the proper speed. Four Model F Ultraviolet lamps, two on a side, which allow starting of the burner as readily as an incandescent lamp, are employed.

I do not wish to give the impression that the solarium is a "cure-all," or that it should be generally adopted, but in the climatic conditions at this point of high northern latitude with overcast skies most of the winter, surrounded by high mountains, it has certainly accomplished much good.

COAL MINE ILLUMINATION*

By THOMAS ALLEN
Chief Coal Mine Inspector, State of Colorado

PART II—RECENT PROGRESS

Mining in the United States, of course, did not start until the country was settled by Europeans, most of whom in the earlier years came from the British Isles. With the development of the American mineral industry in the eighteenth century and its very rapid growth in the nineteenth century, mining practices of the older countries were followed. For illumination the American coal miner adopted the Scotch type of oil-burning cap lamp, and the metal miner adopted the candle.

In both countries large open oil lamps were used on haulageways and air courses where the air currents traveled at a fairly high velocity. In England the large hand lamp was used; in America a larger type of cap lamp was made for use of drivers, rope riders, and others. Occasionally shaft bottoms were lit up by heavy large open lamps being in fixed positions.

Improvements were made in safety lamp construction and design. Very little change was made in open oil lamps except that in England special lanterns for open-light mines were made for the use of mine officials. These lanterns were square-shaped boxes with a carrying handle on top. An oil lamp fitted into the lantern, and this lamp could be removed for refilling through a door on the back of the lamp. The lantern had glass front and sides. The inside of the door, which was the back of the lamp, was highly polished to give more light—this was one of the first attempts in mines to use a reflector as an aid to illumination.

Fuel oil for lamps and lanterns was derived from vegetable and animal fats for centuries. Shale oil was known as early as 1694, but the use of mineral oils did not become common until the Scotch shale industry was developed in the nineteenth century. Kerosene and naphtha were not common fuel oils until the discovery of petroleum in the Drake well in Pennsylvania in 1859. Shortly after this the shipments of oil from the United States slowed down the manufacture of oil in the Scotch shale areas.

Surface lighting at coal mines was extremely primitive. Even as late as the beginning of the twentieth century "fire lamps" were still used on and near pit heads in England. These were iron baskets set on iron legs about 3 ft. long, with a coal fire in the basket. Very large plain open oil lamps were generally used until the coming of the petroleum industry, when naphtha flare lamps and kerosene lamps were designed to use the now plentiful supply of new fuel oils. Surface illumination by the use of manufactured or natural gas was not favored, although an attempt to pipe gas from mines for use in surface lighting had been attempted as early as 1760. It is possible that the miner's experience with the dangers of gas underground made him doubtful of its safety anywhere, or for any use in the vicinity of a coal mine.

Kerosene or paraffin-oil lamps, like most other lights used in mines except the flame safety lamp, were first made for household lighting. The improved illumination offered by these lamps in the home was so noticeable that it was not long before they were used in and around coal mines. These lamps (with glass chimneys) were not suitable for

* Continued from page 76 of April Mining Congress Journal.

working-face illumination, but they were more than satisfactory for lighting around shaft tops and bottoms. Their construction cost was low and they gave a bright light with no smoke. Reflectors could be attached to them very easily whether the lamps were suspended from the roof or set on brackets on the sides of the entry or tunnel near the shaft bottom.

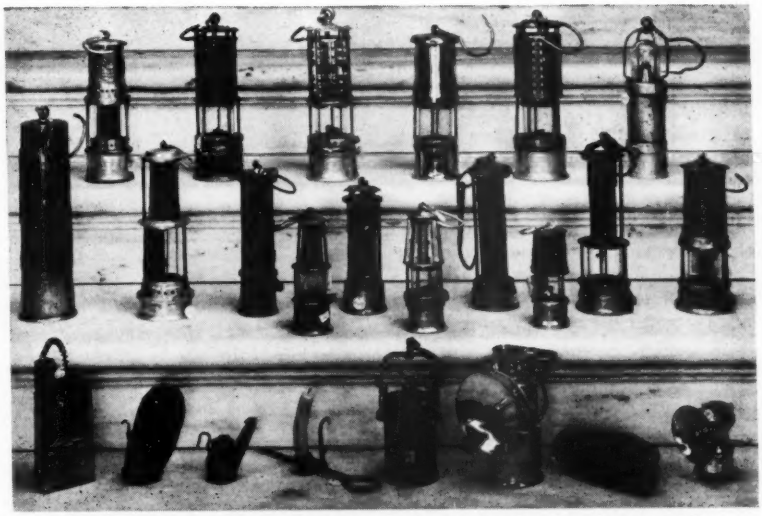
It is possible that the use of the kerosene lamp in the humble homes of the miners where the walls were whitewashed caused mining men to think of the possibilities of whitewash as an aid to illumination on shaft bottoms, for whitewash applications appeared in mines with the coming of the kerosene lamp.

Starting about 1880, safety lamps were improved by arranging the air feed into them; this improved the illumination given by them. Wick adjustment was remodeled; lamps were equipped with internal igniters so the lamp could be lighted or relighted without taking it apart; magnetic locks were put on lamps, and the newer safety lamps were constructed so that they would burn naphtha or high-test gasoline.

With all the improvements possible, the illumination given by the safety lamp was still only a maximum of somewhat less than that given by one candle. The safety lamp was the only safe light for use in the inner workings of the coal mine. Open lights were very little better illumination, and they could not be used in gassy mines.

This poor illumination was blamed for eye trouble, nystagmus, among miners. Those afflicted with this trouble had an involuntary twitching of the eyelids. The flame safety lamp was given most of the blame for this condition; coal miners called the affliction the "Glenny Blink," as Clanny lamps were more common than others, and the north England miner pronounced the name "Clanny" as "Glenny."

While it appeared impossible to improve illumination at the working face, the use of electricity made better lighting possible at shaft tops, shaft bottoms and on main roads in coal mines. The use of electrically driven coal mining machinery commenced between 1880 and 1890, and power lines carrying currents being a necessary part of such installation, electric lights were built into the wiring system. First came the arc lamp for surface lighting, then the incandescent lamp, more suitable for underground illumination.



Varied Assortment of Mine Illumination Equipment (reading from left to right)
Top row—American type for gas detecting; American type iron Wolf miner's lamp; American modern Wolf lamp; American first type of Wolf used in Colorado; American modern Koehler lamp; and German type electric hand lamp, one of first lamps brought to Colorado with rescue apparatus
Middle row—Pieler lamp for gas testing, using alcohol; American lamp with ladder of wires for gas testing; old Davy lamp with shield; early type Baby Wolf American; old Davy lamp, official's type; new type Baby Wolf American; old Davy lamp, miner's type harp lock (first lamp used in Colorado); early English type of small safety lamp; old type Clanny lamp; and old type improved Clanny
Bottom row—English type open oil lamp; American mule-driver oil lamp; American coal digger oil lamp; American metal miner candlestick (from Matchless mine at Leadville, Colo., operated by Tabor); American metal miner old carbide hand lamp; American metal miner new carbide hand lamp; American coal miner carbide and water carrier; and American new type carbide lamp

(The above collection was displayed through the courtesy of Mr. Allen at the recent 17th Annual Coal Show in Cincinnati.)

The portable electric hand lamp was first attempted in 1859 in England, but it was not a practical success. In 1886 the Royal Commission on Accidents in Mines, Great Britain, examined several lamps of this type; in 1899 portable electric lamps were made in Darby, England, and by 1911 these lamps became somewhat general. In the United States portable electric hand lamps were probably first used in 1901—they were used in recovery work following an explosion. The electric cap lamp was not favored in British practice—these appear first in the Pennsylvania anthracite mines in 1908.

During the period of development of electric lamps, a new agent for lighting in non-gassy mines came forward. This was the "carbide" lamp—a lamp using calcium carbide and water as a charge for generating acetylene gas as an illuminant.

Calcium carbide, or "carbide" (as it is more generally called), was known to chemists as far back as 1862, but the first satisfactory method of making it was in 1892.

Acetylene gas (carbide gas) was used for illumination in early still picture machines (magic lanterns). Then self-generating carbide lamps were made for bicycles. These lamps were used on the bicycles of coal miners who rode to work in this manner, and occasionally they were carried as lanterns by miners walking to and from work. The bicycle lamp was taken into open light coal mines, and from this came the idea of a small carbide head lamp and also the larger hand lamp for metal mines. The miners' carbide lamp started really to replace oil lamps in 1906. At first the new type of lamp was distrusted in some places, and some resistance was offered to its general introduction into coal mines; but its illumination was so superior to that of the oil lamp that in a short time it was used almost exclusively in open light coal mines in the United States.

The carbide lamp with its several candle power illumination was the biggest step made in providing a better open light for individual miners in non-gassy mines in the history of mining.

The portable electric lamp with its better light rapidly came into favor, but most of the reason for the carbide lamp losing ground was not in the lamp itself, but because of the very

indifferent methods of ventilating mines. The open light was severely criticized in many cases where the blame should have been placed on bad ventilation and equally bad methods of working. Many of us can remember the not very old practices—fans too small to deliver enough air; single current systems of ventilating whole mines; poor construction of stoppings; the dependence of ventilation on trap doors on haulage roads; working faces driven long distances ahead of the air supply; and systems of mining where large areas of abandoned unventilated workings were a constant menace. Too often the open light alone was given as a reason for gas ignitions and explosions when most of the responsibility should have been placed on bad operating conditions in the mine leading up to where the open light could be the final contributing cause of disaster.

In the last two decades the science and art of coal mining has made much progress; the last ten years have seen the adoption of advanced ideas which could be called revolutionary when compared to methods practiced 20 years ago.

New methods of working, new types of machinery, better ventilation, more detailed supervision, active training of mine employes, better illumination and many other features unheard of a few years ago are becoming common practice in most of our modern coal mines.

The extensive use of electricity in modern coal mining operations has afforded a means of providing excellent illumination if the lighting system is well installed, with the result that electric lamps either stationary or portable are gradually replacing all other methods of mine lighting.

In the working places of a mine, the electric cap lamp has completely replaced the flame safety lamp as a light; the flame safety lamp is used no more except for the detection of firedamp or blackdamp mixtures in coal mine air. At its best, the flame safety lamp gives only an approximation of the condition when it is used as a gas detector—therefore, it is being replaced by electrical and chemical detectors of extreme accuracy. With the development and use of these newer detecting devices, the flame safety lamp, in coming years, will entirely disappear from coal mines.

Candles and open flame oil lamps are now things of the past. Carbide lamps may have reached their maximum of illumination and convenience, and they cannot be used safely in

MSA Electric Cap Lamp and Safety Cap

mines generating dangerous quantities of explosive gas. Another fact which will affect their use materially is the installation of mechanical coal loading machines equipped with electric lights. With the introduction of such machinery, the day of the hand miner using a carbide lamp is rapidly drawing to a close. These developments indicate that the future of coal mining appears to be complete electrical installation for lighting purposes except in the smallest of operations.

Mine illumination has progressed so rapidly it may be possible that detailed research and investigation of the proper or more efficient installation of lighting systems is not keeping pace with the development of this phase of mining operations; also, that publications giving the results of studies which are made of mine lighting problems, or in fact of any other branches of mining efforts, are not distributed widely enough. Current magazines which publish general mining information do not have a circulation reaching many more than the upper brackets of the management group.

Wheat Electric Cap Lamp and Safety Cap

Publications of the United States Bureau of Mines, which, for cheapness, are in many instances only mimeographed copies printed in limited numbers, do not reach many who should have them. Also mimeographed copies are not attractive reading, and they are not adapted to ready and convenient filing. These conditions might be remedied to some extent by establishing more facilities for research work, with some method of wider distribution of publications of their findings so that the coal mining industry would be more fully and sooner informed of newer, proven and better ideas for safe and efficient coal mining operation.

When mine lighting by electricity is considered, the system is more often than not left to the discretion of minor officials who are guided generally by previous practice, and to the thought that it is sufficient to install any number of lamps which they might consider enough. Lights on shaft bottoms and side tracks may be hung along the side or along the center line of the roadway, according to what appears to be the most convenient place. Proper arrangement for the best illumination and economy of installation is rarely considered. The average mine electrician, without instruction and a definite plan of installation provided by some one with expert knowledge, proceeds as he has done before, or follows some plan he may have seen when visiting a neighboring mine. It is fortunate that the electric lights used in coal mines give a high degree of illumination and that no matter how they are set they give fairly good results in the way of a more or less satisfactory light.

The best of lighting devices and equipment for installation does not mean a maximum and most efficient illumination. There are many conditions in mines which interfere with and reduce the efficiency of lighting systems. Many of these conditions may be easily overcome; but too often they are not removed, or the remedy for them is applied only half-heartedly.

For instance, surfaces in the area to be lighted might be whitened by the application of coats of cheap lime whitewash. These coats should be washed at intervals and new coatings applied. Some surfaces could be painted with a cheap glossy paint needing only washing as they get grimy or dusty. Or the walls and roof may be coated with a very light color rock dust—such applications offer an additional safety feature in that they re-

tard coal dust explosions. Rock dusting and whitewashing are not costly applications compared with results obtained, especially in the case of rock dusting where protection is given against explosions together with improved illumination.

Lights should be arranged so that all possible glare is eliminated, and they should be placed so that they will not cast shadows from themselves or from other objects like pit cars on side tracks.

Lights should be arranged so that fluctuations in voltage will be avoided. They should also be placed and guarded to avoid breakage as far as possible.

More lights should be placed near switches—in many cases a single light is placed at such points merely to indicate the location of the switch.

Light globes should be cleaned repeatedly, because coal dust settles on them—no light is worth anything if it is hidden beneath a thick coating of coal dust.

Reflectors, where necessary, should be kept cleaned and polished at all times. Burnt out lamps should be immediately replaced, and the practice of waiting until several lamps are burnt out should not be allowed.

The wiring arrangements should be inspected frequently, and defects from any cause should be repaired at once.

Some conditions reducing mine illumination are not so readily removed. One of these is the presence of coal dust in suspension in the mine atmosphere. Coal dust in addition to reducing visibility is such an explosion hazard that good mining demands that it should be kept down to an absolute minimum production. This can only be done by the use of a plentiful supply of water. Water sprays should be applied on all cutter bars of machines, on loading heads and conveyors of mechanical loaders, mine cars both loaded and empty should be sprinkled, and working faces should be kept wet when blasting. With effective sprinkling the coal dust condition may be controlled so that the explosion hazard is a minimum. The final control may be secured by thorough rock dusting of all roadways in the mine up to within a very short distance of the face, this in addition to the sprinkling or watering arrangements. Applications of water and rock dust each have a double action for safety—they aid illumination and reduce coal dust explosion hazards.

Ventilation arrangements in coal mines have a direct bearing on the problem of proper illumination. Where the mine condition is damp, the temperature fairly high and the ventilating current is very slow, the moisture carried in the air will cause a fog which reduces visibility. High velocity air currents on dry high speed haulage roads pick up and carry fine rock dust or coal dust in suspension. Powder smoke and fine dust from mining in badly ventilated working places cuts down the light given by any method of illumination. Lack of ventilation or improperly arranged ventilation in mine workings generating explosive gases may make the installation of electric power lights so hazardous that they cannot be used.

Many of these interferences of illumination caused by improper ventilation can be eliminated. The ventilation of a modern mine should be arranged with large volumes of air entering the mine; multiple entry systems of development; complete installation of the air split system; and ventilation of working places so that the return is ahead of the last place with cross-cut connection to the return airway for the district. Newer arrangements of ventilation must be made for successful operation of modern mechanical loading devices operated by electricity and requiring the use of power lights for efficient illumination.

There are many new ideas coming forward in which illumination, visibility and reflection are used for reduction of accident hazards in coal mines.

For many years lights have been used on locomotives and on the ends of moving trips. More recently the use of red lights on the ends of trips is becoming established, and again this idea has been expanded to include the use of red reflector buttons on the edges and corners of single mine cars.

Flash systems of signalling have been used for a long time: the flash now is being used as an indicator on modern firedamp detectors.

Signal boards on shafts, and sign boards in and around coal mines are being made up with luminous paint for better visibility.

Surface arrangements around coal mines nowadays have very good systems of lighting aided by the use of luminous paint on construction. The modern coal mine surface arrangement is very much different than the old time grimy and greasy fire trap of a few years ago. It presents a picture to the passer-by of an evidently safe and efficient operation which cannot but help create a more favorable impression of the industry on the observer.

All in all, coal mining illumination has progressed materially in the last few years. Further improvements will be made because good illumination goes hand in hand with efficiency, safety and accident reduction. This is proved by comparison of records of well lighted mines with those where the illumination is not what it should be.

Death and injury lurk where there is darkness—it is hoped that this may be realized by those who lag behind in providing the best light, and that the day will soon come when all operations in coal mining, the country's most vital industry, will fall in line with the progress being made in mine illumination installations.

Dustless Treatment of Coal

The Research Foundation of Armour Institute of Technology, according to announcement made by Harold Vagtborg, director, is launching an extensive program of research on the dustless treatment of United States coals. This program is one of several carried on by the Armour Research Foundation in the study of coals, their uses and possible treatment for better and more efficient utilization.

It will be remembered that the Foundation, little less than a year ago, pioneered in the use of coals in liquid form to run a standard-make automobile. The liquid coal study, which is currently being brought to perfection, is specifically designed to be a means of utilizing the "fines" which are useless waste products of coal mining (fines are coal dust resulting from mining coal and have no market value.)

Mr. Vagtborg further revealed that the Foundation has been conducting preliminary work in this field since 1939, under the supervision of Dr. F. W. Godwin, director of chemical engineering research, laying the groundwork for the present program. This research program is aimed at making available to the householder at a low cost, coal which will not deposit dust; coal which, in other words, can be delivered to the home without soiling the wash on the clothes line. Undertaken through the cooperation of the Johnson March Corporation of New York, the investigation will be made in the existing Armour Research Foundation Coal Laboratories and also in the field. Dr. Martin H. Heeren, staff member of the Foundation chemical engineering division, will conduct the study.

The March of COAL MINING

Ten Years of Progress

SEAM IMPURITIES—Problems of Removal and Reclaiming

By G. B. SOUTHWARD
Mechanization Engineer
American Mining Congress

COAL mining is more than mining coal—it includes mining things in addition to coal, such as slate, bone, or whatever impurities happen to be present in the seam. This, of course, has always been the situation, but within recent years the coal consumers have become so exacting as to what they buy that operators have been forced to take an entirely new attitude toward the importance of removing these impurities from their products.

Mechanization for Loading and Preparation

Coincident with these market changes, mechanized loading has come into use and a great many people have fallen into the error of believing that the new preparation problems have been caused by loading machines. It is true that mechanization has introduced its own difficulties in the matter of coal preparation, but these in themselves would have been comparatively simple had the consumer's specifications remained the same as they were 10 or 15 years ago when loading machines were first put into operation. Regardless of mechanization, the situation that actually exists to some degree already, and one that is rapidly becoming more widespread, is that, except in a few mines with particularly favorable seams, hand picking would not meet today's market requirements for quality any more than the old bar screens would meet the present specifications for sizing. As a consequence, and as a matter of necessity, many preparation practices are now in use and others are under development that would have had no justification a few years ago.

But even the modern methods for handling and separating impurities are influenced to a large degree by some ideas which have been inherited from several generations of hand mining. One of these ideas is to bring to the tipple as small a volume of impurities as possible. This, of course, is necessary where picking tables are the only cleaning method used, but with the advent of mechanical cleaning, we are still holding to the practice of lightening the work that the preparation plant has to do. In some mines selective mining can accomplish this purpose economically, but in other cases considerable money is being spent on hand methods underground to remove impurities that could be more economically loaded by machines and removed mechanically on the surface. It may be true that present cleaning plants, designed as they are to handle a minimum amount of impurities, could not take care of the added burden, but the separation principles that have been proven by modern cleaning practices certainly furnish sufficient evidence to prove that their scope can be widened.

Value Lost in Reject

We are still thinking too much in terms of yield and reject as applied to the tipple product, but actually the true reject was fixed by nature when the seam was formed, and whether we bring it to the tipple or not, the reject is still present. The accompanying sketch illustrates this point. This shows a hypothetical seam, 6 ft. in height, containing a total of 6 in. of partings which are separated at the surface plant. In this case, the yield would be considered as 91.7 percent, although, as the sketch shows, there are 12 in. of impurities directly over the seam which, we will assume, have to be taken down and loaded out as a separate operation. Therefore, the 12-in. top section is also reject, and taking into account all of the material which has to be handled and brought to the outside, the actual yield from this seam is only 78.6 percent, instead of the 91.7 percent yield from the cleaning plant.

Continuing the consideration of this hypothetical seam, and continuing the assumption that the 12-in. top section will fall sooner or later, it is becoming the practice, in such cases, to recognize that since the top must come down eventually, it is better to take it down as a part of the regular operation. It would further appear that, in this example, there is a sufficient quantity of reject material to justify mechanical methods for its removal.

Then, there is another factor to take into account; the waste product that is sent to the slate dump may have a fairly high percentage of recoverable fuel. The "dirt seam" may contain some good coal or else coal will unavoidably become mixed with the refuse in the natural course of its underground handling. Conversely, many cars loaded as good coal are sent to the slate dump because they have

become contaminated by impurities through falls or other reasons, and will not pass the tipple inspection. Therefore, the waste or rejected portion of the seam may have a higher fuel content than most of us realize, and when the mining company has already paid good money for bringing this material to the outside, it is obvious that any recovery of value that could be made from it would be "pure velvet."

Separation Refinements

There are several answers to the difficulties which are caused by impurities in the coal seam, and there are several sources of possible economy that can be made through the application of complete mechanization in their handling, removal and recovery, which may be listed as follows: (1) utilizing the reject from the preparation plant; (2) replacing hand picking tables by mechanical processes; (3) eliminating separate slate loading underground by passing entire product through cleaning plant; (4) loading mine refuse as separate product underground and treating it in a cleaning plant specially designed for this type of material. In addition to the foregoing methods, there is the development of selective mining, but this is an entirely different subject from the one under discussion.

Reclaiming Mine Refuse

The recovery of the mine refuse—that is, cars of slate and coal which are normally sent over the slate dump—has recently been inaugurated by one company, and the results after some months of operation have proved the economic practicability of this procedure. This is an entirely new development, and the following brief description of the factors which entered into the decision for adopting this method should be of considerable interest to other operators who have a similar problem.

The major portion of the seam at this mine is a high-grade fuel, but above the main bench the coal is of lower quality and also contains a considerable amount of slate. Consequently, the practice is not to load as good coal the top section. However, the top section, amounting to about 18 inches of coal and draw slate, cannot be held in place, and it is therefore customary to take this down in the entries after the main seam has been loaded out—bringing it to the outside and sending it over the slate dump.

A thorough investigation, made to determine the possibility of reclaiming the coal from this refuse, indicated that a large amount of combustible material could be recovered economically by mechanical cleaning, but the analysis of the product was such that no part of it could be mixed with their regular high-grade fuel. Therefore, a search was made to find an outlet for this product, and a market was located where the transportation costs would permit this reclaimed coal to compete with other fuels of similar grade that were being used in that area.

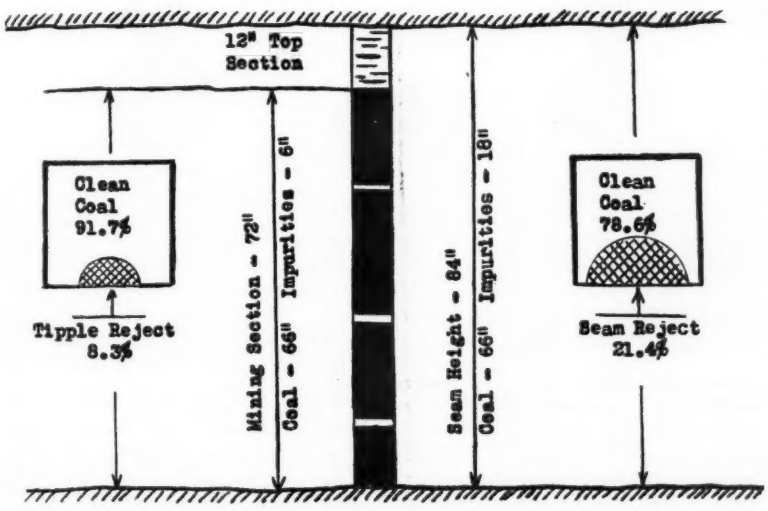
A separate cleaning plant was recently installed, designed especially to handle this class of material, and has been in operation long enough to prove conclusively that the method is economically successful in that particular location. Roughly, 30 percent of the mine refuse is recovered and shipped as a commercial fuel.

One interesting fact was discovered in the early stage of the operation. The mine refuse naturally contains many large pieces of slate, and in the first investigation it appeared that the proper procedure would be to remove these by hand picking off the feeder belt, and thereby reduce the burden of the refuse cleaning plant. However, a study on the labor of hand picking the large pieces showed that it was much more economical to have the cleaning plant take care of the entire product mechanically.

Conclusion

This company is pioneering a practice which has great possibilities for the coal industry. Thousands of tons of coal, mixed with slate, are being wasted over slate dumps, and thousands of dollars are being spent by coal companies in an effort to keep dirt out of coal underground which could be separated economically by mechanical methods on the surface. The operation outlined in the few preceding paragraphs may not be widely applicable, as a certain combination of factors and conditions which existed at this mine made the method practicable there. However, a general principle is being demonstrated which is well worth attention and study by coal mining men.

Things are changing; and clean seams, or those where the coal and impurities can be easily separated, are being mined out. We have not yet reached the point of working what, in metal mining, would be termed "low-grade deposits," but unprepared or "raw coal" is beginning to disappear from the commercial market. So we do have to start thinking in terms of ultimate recovery and to realize that the value in waste products can no longer be disregarded.



Hypothetical seam section showing tipple reject and seam reject

With the COAL DIVISION

of the AMERICAN MINING CONGRESS

STANDARDIZATION of TROLLEY WIRE SHAPES

+ + +

Report by A. L. Johnston, member, to the Chairman of the Power Committee of the Coal Division of the American Mining Congress on progress that has been made and definite accomplishments achieved in arriving at "Standards covering the various sizes, shapes and dimensions of copper trolley wire for mine and industrial uses."

+ + +

AT a National Electrical Manufacturers Meeting of the Joint Standards Committee, of which the writer was chairman (held in February, 1939), and composed of representatives of the trolley wire interests and manufacturers of fittings used in connection with the installation of trolley wire, the following conclusions were arrived at after much discussion and taking into consideration previous correspondence on the subject.

Fig. 8 Wire

First, Fig. 8 Wire: Certain modifications were recommended for the top lobe shape of the Figure 8 wire in the 350,000 circular mil size in order that it conform more closely to the contour of the 4-0 size. This recommendation was made for the obvious reason that it was very desirable to have one style and size fitting, such as trolley clamps, that could be used interchangeably on any size of this wire. By referring to Fig. A it will be observed that shape of the top lobe on the 350,000 C. M. size varies materially from that of the 4-0 size as shown by Fig. B; therefore the shape as shown by Fig. C was recommended for the 350,000 C. M. size Fig. 8 wire, and this cross section had already received the approval of the committee representing the American Mining Congress.

Fig. 9 Wire

Second, Fig. 9 Wire: It was recommended that in the future all reference to this shape and type of trolley wire be simplified by adopting the designation "Fig. 9 deep-section grooved trolley wire." The inclusion of the words "deep section" is to avoid any conflict with the standard grooved section wire as shown in Figs. D and F.

A suggestion by the Wire Group at the Joint Standards Committee meeting, that inasmuch as the large or 400,000 C. M. size of the Fig. 9 deep-section wire had been in use for many years by the mining industry, and had been adopted as standard for a number of operations, there would undoubtedly be a demand for this particular shape having slightly less area and carrying capacity. This suggestion was carefully investigated by all interests and it was felt that in view of the better contact secured between trolley wheel and fittings with a deep section wire than one having a round cross section, the user could secure many benefits.

Fig. A

Fig. B

Fig. C

Standard Grooved and Deep Section Fig. 9 Wire

Recommendation was therefore made that a new size Fig. 9 deep-section grooved wire having a nominal cross section of 350,000 C. M. be included in the proposed specifications. The relative area of contact between a standard 1½-in. trolley wheel when passing over a trolley splicer of the tubular type on a *standard* 350,000 C. M. grooved wire, and a similar splicer used on a wire of the same circular mil area but having a *deep section,* are clearly shown by referring to Figs. D and E. Fig. D shows a cross section of a 350,000 C. M. standard grooved wire on which a splicer has been applied and which indicates the lack of a good contact with the trolley wheel groove.

Fig. E shows the new 350,000 circular mil size Fig. 9 deep-section grooved wire also with a splicer applied, but in this case the splicer shape so closely conforms to the groove of the trolley wheel that a much better wheel contact is secured. This same result is also noticeable in case of approaches on trolley frogs, cross-overs, etc.

Fig. H shows in an enlarged form a cross-section of a 350,000 C. M. trolley wire, the solid black figure indicating the deep section shape, while the shaded sides represent the conventional or standard grooved shape; the top lobe and grooves being identical in both cases.

Fig. F indicates a 350,000 C. M. standard grooved wire with splicer, whereas Fig. G shows a 400,000 C. M. Fig. 9 deep-section grooved wire also with splicer. The comparison clearly shows that better wheel contact is secured in case of the deep section wire

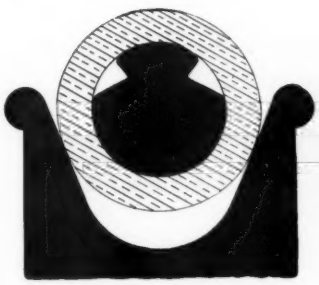


Fig. D

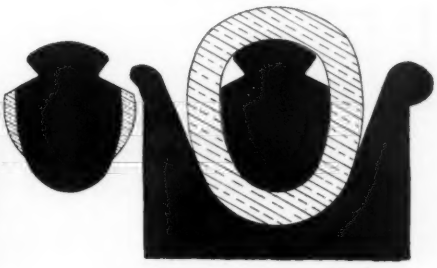


Fig. H Fig. E

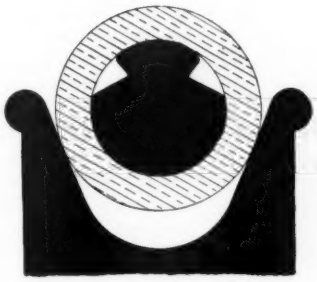


Fig. F

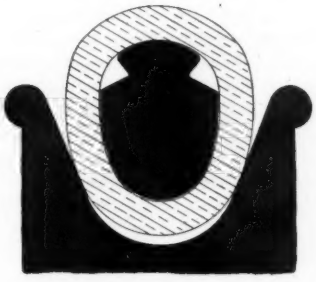


Fig. G

even though it has a 50,000 C. M. greater area than the standard grooved shape.

Recommendation was also made by the joint committee that the top lobe diameter and angularity of the grooves in case of the new 350,000 C. M. size Fig. 9 deep-section wire conform to that of the existing 400,000 C. M. size, the lesser area being taken care of entirely in the lower lobe of the smaller wire. The top lobe and grooves of the Fig. 9 deep-section shapes are, therefore, exactly the same as those of the standard grooved style, thus allowing all of the clamp type fittings to be used interchangeably between the two different styles of wire, which practice is manifestly to the advantage of the user.

New A.S.T.M. Standard

Third: In accordance with the suggestions and recommendations made by the N. E. M. A. Joint Committee as outlined in this report, the committee B-1 of the American Society for Testing Materials made their report in the 1939 preprint, and favorable action was taken on this subject at the June, 1939, meetings of the society with the result that it was decided that a new A. S. T. M. Standard be prepared covering tentative specifications for Fig. 9 deep-section grooved and Fig. 8 copper trolley wire for industrial haulage. This tentative Standard, therefore, will in no way conflict with the present standard specifications for copper trolley wire B-47, which covers the round and standard grooved sections. Accordingly, there is now available an "A. S. T. M. Tentative Specification for Fig. 9 Deep-Section Grooved and Fig. 8 Trolley Wire for Industrial Haulage," and copies of this specification can be secured for a nominal sum from the American Society for Testing Materials at 260 South Broad Street, Philadelphia, Pa., under designation "A. S. T. M. B116-39T." These specifications cover material, tensile strength, shapes, dimensions and permissible variations, resistivity, finish, method of packing and shipping, and causes for rejection. Explanatory notes are also included.

Your committee suggests that a copy of these tentative A. S. T. M. specifications be secured by all users of Fig. 9 and Fig. 8 trolley wire who purchase such wire by the reel. The correct reference for the standard specifications covering copper trolley wire of the *Round* and *Standard Grooved* shapes is covered by A. S. T. M. designation B47-39, and copies of these specifications are also available to those interested.

Strength of Washington Coke

That coke produced from coal mined in the state of Washington is strong enough for the smelting of iron ore in the blast furnace, may be concluded from a technical paper recently issued by the Bureau of Mines, U. S. Department of the Interior.

Although Washington has been a coke-producing state for more than 50 years, but little specific information dealing with properties of coke as evaluated by standard tests now used in the industry has been published. To fill this gap a comparative investigation of the physical and chemical properties of Washington cokes has been made. Especially with the prospect of an ample supply of electric power being shortly available in this state, an increase may occur in the use of coke in electrothermal and electrometallurgical industries; hence, definite, authoritative information about the properties of coke which can be produced from Washington coals will be essential.

Twenty samples of cokes were examined. Fourteen of these were from Washington, three from British Columbia, and one each from Utah, England, and Germany. These cokes were produced by commercial processes on an industrial scale. The foreign cokes were included for comparative purposes because small amounts of them reach the ports of Washington.

Standard shatter tests made on the coke samples demonstrated that strong cokes, resistant to shatter degradation are being made from Washington coals. Particularly the cokes made of coal from the Wilkeson area are stronger than those made in some other parts of the United States. The average 2-inch shatter index for the Wilkeson cokes was 82, whereas some of the eastern and southern cokes had indexes of about 70.

The tumbler test results showed that Wilkeson, Wash., beehive cokes are resistant to breaking into smaller pieces and hence have high stability factors. Lower stabilities are shown by the by-product cokes from Washington and British Columbia. Comparing the tumbler test results of Washington cokes with those reported in the literature for a number of eastern and southern cokes, it is seen that Washington cokes are less resistant to abrasion than these eastern and southern cokes.

The sulphur content of Washington cokes is low, and meets the specifications for foundry coke. Indeed, Washington cokes have only one undesirable feature—a rather high ash content. However, cokes of similar ash contents are being produced and used in some southern and midwestern districts.

WHEELS of Government

● *As Viewed by A. W. Dickinson of the American Mining Congress*

EVEN though lights burn brightly in the offices of the State, War and Navy Departments during this springtime in Washington the drive goes on for an early adjournment of the Congress. The legislative measures desired by the Administration including the Appropriation bills are practically at the end of their course, and it is the general feeling at present that June 10 or thereabouts will see the Congress outward bound with the Administration's blessings. The general belief is that the European war in its present stage need not be the cause of extending the present session and that any incident which may occur in the Pacific can be sufficiently met as and when it develops.

Taxation—Coal Legislation

In addition to the naval expansion of 11 percent authorized in the current naval appropriations bill the President in his personal address to the Congress on May 16 asked for the immediate appropriation of $1,182,000,000 for additional defense expenditures. This is expected to raise the question of a revenue bill which can be handled quickly, if presented, as by an over-riding tax of 10 to 15 percent on total income tax paid; however it is still the general belief that there will be no new tax law at this session, and that the 76th Congress will permit its successor next January to wrestle with the problem of either increasing revenue or raising the $45,000,000,000 debt limit.

It is now generally conceded that there will be no hearings in the present session on the bill introduced by Representative Robert Allen of Pennsylvania to amend the Guffey Coal Act. Administration forces are apparently quite anxious that the prices announced to cover coal sales throughout the entire country shall be given a trial when once they are put into effect, and it is apparently the intention to press on for an effective date in the neighborhood of August 1. The refund ruling made by the Director of the Bituminous Coal Division against the possible eventuality of the Act or the prices under it being declared invalid is an interesting development, discussed in a little more detail on page 56. Favoring administration desires the Senate Appropriations Committee recommended and the Senate approved restoration of the $1,200,000 cut from the Bituminous Coal Division appropriation by House action several weeks ago.

Hearings before the House Mines and Mining Subcommittee on the Neely Federal Mine Inspection bill are scheduled to begin May 16 with a presentation by United States Bureau of Mines' witnesses, followed by a succession of State Governors and State Mining Department representatives from a large number of coal producing States. It is then expected that representatives of the mine workers will be heard, followed by operators and representatives of mine operating organizations throughout the country.

The President has sent his appointment of Dr. R. R. Sayers as Director of the United States Bureau of Mines to the Senate for confirmation, the appointment now being under consideration of the Senate Committee on Mines and Mining.

The Wheeler-Lea Transportation bill which has been in a Senate-House Conference Committee since last summer was reported by the conferees early in May, but the House voted to recommit the bill to conference and gave its own conferees additional instructions. These instructions would require special rates on farm exports; that carriers may reduce rates so long as a compensatory return to the carrier is maintained; and that railroad employes be protected in their jobs in the case of consolidation or abandonment of transportation facilities. It is believed that agreement on provisions such as these will be impossible in the short time left in the present session of Congress and that the bill will accordingly die.

Foreign Silver

The Republican Senator from Delaware, Mr. Townsend, on May 9 pushed through the Senate his bill, S. 785, prohibiting purchases of foreign silver and repealing the transfer tax on transactions covering any interest in silver bullion. Several Senators from silver-producing States, knowing that the Administration did not wish its silver purchase power interfered with, took occasion in the course of the debate on the bill to draw comment from the administration forces which they regard as useful material for future treatment of silver questions. Senator Pittman offered an amendment permitting the exchange of agricultural products for foreign silver to which Senator Adams of Colorado added the products of mining and manufacturing. Both amendments were lost as was also the amendment offered by Senator King of Utah, which would have legalized the possession of gold by citizens and provided for the coining of gold with which to pay for new gold received by the Treasury. The Townsend bill has been messaged over to the House and is still on the speaker's desk, whence it will probably be referred to the Committee on Ways and Means because of the silver transfer tax features involved. Prospects for final enactment of the measure are considered to be quite remote, as it is known to be the policy of the majority party leaders to use all legislative means of delaying action.

Wage-Hour

The first action taken by the House on the Norton-Barden-Ramspeck amendments to the Fair Labor Standards Act of 1938 was the approval of a resolution opening all three of these bills to amendment. Under this rule the Barden bill was called up and was so heavily loaded with amendments that Representative Barden abandoned it, and Representative Ramspeck of Georgia, announced that he would withdraw his own measure. The Norton bill originally sponsored by the Department of Labor was then considered, and was also so loaded with amendments that on May 3 the House voted 205 to 175 to recommit the bill,

thus ending the Wage-Hour controversy for the present session.

One amendment offered by Representative Ramspeck of Georgia, and accepted by the House before the Norton bill was recommitted is worthy of careful note. It would have amended Section 7 (b) (1) and (2) of the Wage-Hour Act to permit approval by the Administrator of agreements between employers and employes exempting workers from the hours provisions of the law where the weekly average of hours worked over a 26 or 52 weeks period was not in excess of 40 hours. This is in line with the amendment originally proposed by the American Mining Congress when the Wage-Hour bill was in conference in June 1938, but which at the last minute was changed in the Conference Committee to require that such arrangements must be "in pursuance of an agreement, made as a result of collective bargaining by representatives of employes certified as bona fide by the National Labor Relations Board."

National Labor Relations Board

It is now expected that the Norton and the Smith amendments to the National Labor Relations Act will come up for House action under an open rule during the week of May 20. The mild Norton amendments which would increase the Board to five members, permit employers to petition for elections, give craft units or small units separate bargaining representation if desired, and provide one-year life for employer-employe contracts, may possibly pass the House. The Howard W. Smith amendments although sent to the floor by the Rules Committee, had never had the approval of the Committee on Labor. These amendments would do a thorough overhauling job on the Wagner Act, but their chance of acceptance by the House is known to be slim. Predictions are that the battle in the House over these two amending bills will transcend in its bitterness the recent struggle over the Wage-Hour Act amendments.

Steadily and effectively the Howard W. Smith Investigating Committee has continued to bore into the improprieties committed by the National Labor Relations Board. A former trial examiner for the Board recently took the stand and presented substantiating testimony concerning the statement in his letter of resignation in which he had said "A majority of the members of your Board continue brazenly and openly to foster Communists and kindred radicals."

Stream Pollution

Still awaiting a meeting and action of the conferees on the Barkley-Mansfield pollution bill, the managements of mining and other industrial enterprises continue to be deeply concerned over the presence in the bill of the undesirable "Mundt amendments" which would forbid "new sources of pollution" and foster Federal court actions at the behest of governmental agencies with harmful and even paralyzing results. It is generally believed that wisdom will prevail and that the Mundt amendments will go out, but wild-life society groups are carrying on a vigorous campaign in which they have been joined in part at least by United States Bureau of Public Health officials, who are apparently feeling the urge of the usual bureaucratic desire to expand activities and secure larger and larger appropriations.

Restraining Federal Agencies

Despite the pleadings of Administration leaders in the Senate that action be deferred on the Walter-Logan bill (already passed by the House) which would curb Federal agencies, the Senate Judiciary Committee recently not only reported the bill to the Senate but also recommended that it receive favorable consideration in the present session of Congress. This again is an expression of the resentment felt by members of Congress toward the bureaucratic administrative handling of many of our existing laws by the agencies of the Federal Government. The rights given by this bill, if passed, to a citizen to appeal to the Courts against arbitrary bureaucratic ruling and action, have been an ever increasing need—particularly so since the serious mal-administration of the National Labor Relations Act.

TNEC

This Committee under the Chairmanship of Senator Joseph C. O'Mahoney of Wyoming, has suspended further hearings until after the November elections. In its most recent hearing on the effect of technology on unemployment, some very interesting facts have been developed by industrial witnesses from automobile, railroad and other fields of enterprise. Witnesses from the coal industry appearing before the Committee have shown that the chief technical advances which have caused unemployment have been those which have brought higher efficiencies in the consumption of coal, although these improved practices have been made necessary by the pressure of competition from oil, gas and hydro-electric power. The suggestions were made to the Committee that a sufficient protective duty be maintained against imports of oil and gas, and that in our domestic structure the sale of gas to large consuming industries at ridiculously low rates be investigated and corrected; furthermore, that our own Federal Government immediately withdraw from the hydro-electric generating field, and thus remove a highly improper subsidized competition with private industry.

The Federal Trade Commission Building

NEWS and VIEWS

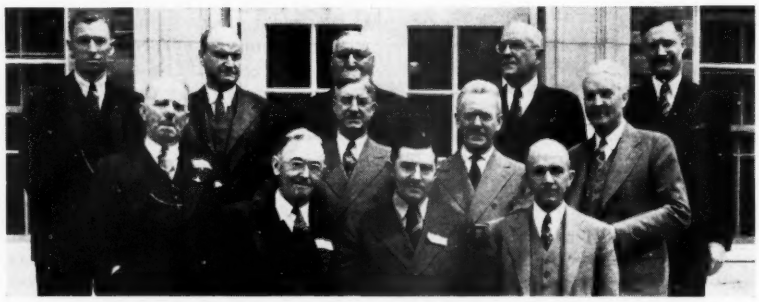
Meeting of Missouri Mineral Industries Conference

Roy E. Mayes, president of the Carthage Marble Company, was elected chairman of the Missouri Mineral Industries Conference at the second meeting of this organization held on the campus of the School of Mines and Metallurgy at Rolla, on April 26 and 27. Mayes was the principal speaker at the dinner Friday evening, April 26, given by the Conference and the St. Louis section and the Tri-State section of the American Institute of Mining and Metallurgical Engineers.

The Mineral Industries Conference, according to Dr. H. A. Buehler, head of the Missouri Geological Survey, was organized for the purpose of gaining a better knowledge of the possible services that can be rendered by the Missouri Geological Survey, the Missouri School of Mines and the United States Bureau of Mines, to the industries that these institutions are organized to serve, and that these institutions and the industries may be drawn into closer contact with the problems which the institutions are maintained to help.

A total of nine technical papers were heard at the conference dealing with the various phases of Missouri's mineral industries.

Other officers elected include A. E. Stocking, of DeSoto, Mo., as vice chairman; W. M. Weigel, of St. Louis, secretary-treasurer; and the following members of the Board of Directors: C. M. Butler, Cape Girardeau; E. G. Doane, Poplar Bluff; G. C. Smith, St. Louis; E. H. Lewis, Webster Groves; C. W. S. Sammelman, St. Louis; Arnold Griffiths, Jefferson City; T. Inkley, Ste. Genevieve; P. A. Haines, Rivermines; Ralph Smith, Ste. Genevieve; and George Fowler, Joplin.



Officers and directors of the Missouri Mineral Industries Conference, which met at the School of Mines and Metallurgy at Rolla, Missouri, April 26 and 27
Front row, left to right: W. M. Weigel, Secretary-Treasurer; Roy E. Mayes, President, and A. E. Stocking, Vice Chairman
Second row, left to right: Ben Reynolds, C. M. Butler, Dr. E. W. McCourt, and Earl Doane.
Third row, left to right: Evan Just, George Fowler, T. Inkley, Chief Buehler, and Dr. W. R. Chedsey

West Virginia Publicizes Coal Resources

Basing one of its initial ads on the abundance of coal, West Virginia opened its first advertising campaign in the April issues of *Fortune, National Geographic, Nation's Business, Manufacturers Record,* and in the March 18 issue of *Time.*

West Virginia's schedule, which will be continued through the next several months, is under the supervision of a publicity commission formed by legislative enactment, composed of Governor Homer A. Holt, chairman; J. B. McLaughlin, commissioner of agriculture; Burr H. Simpson, state road commission; H. W. Shawhan, director, conservation commission; and C. C. Tallman, superintendent, department of public safety. The legislature appropriated $25,000 a year for two years to be spent by the Commission in this work.

West Virginia, producer of about 26 percent of the nation's bituminous coal, has experienced a remarkable industrial growth in the past decade, its total resources, geographical location, and stability having attracted a varied list of manufacturers.

Thirty Pounds of Nonferrous Metals Needed Per Ton of Steel

For every ton of steel produced, the steel industry purchases about thirty pounds of nonferrous metals for use as ingredients in steel or for coating finished steel products, according to the American Iron and Steel Institute.

When steel operations are at 70 percent of capacity, the industry annually consumes for those purposes a total of 675,000 gross tons, or more than a billion and a half pounds, of metallic aluminum, chromium, copper, lead, manganese, molybdenum, nickel, tin, tungsten, vanadium, and zinc.

The total does not include the amount of aluminum, copper, lead, and some of the other metals which may be purchased for other than metallurgical purposes, nor does it include the nonferrous metals in purchased equipment.

More than four-fifths of the industry's total consumption of nonferrous metals consists of manganese and zinc. Operating at 70 percent of capacity, the steel industry buys about 329,300 tons of manganese metal and 220,100 tons of zinc per year.

Manganese comes chiefly from Russia, Africa, Brazil, Cuba, and India, and its principal use in steel is to remove gases from the steel. The United States is the chief source of supply for zinc, used as coating for galvanized steel products.

Other nonferrous metals used to coat steel are tin and lead. At 70 percent operations, an average of 42,000 tons of tin and 5,600 tons of lead are purchased annually. British Malaya, England, and Netherlands Indies supply most of the tin, while the lead is produced in this country.

About 3,800 tons of copper, and 3,400 tons of tungsten are consumed annually when the steel industry operates at 70 percent of capacity. The United States is self-sufficient in copper and produces some tungsten, but most of the tungsten consumed is imported from China and British Malaya.

This country has ample resources of molybdenum, about 2,200 tons of which are consumed at 70 percent, and produces a substantial part of the 500 tons of vanadium required annually at that rate of activity. Vanadium is also imported from Peru and Rhodesia.

Industrial Collieries First-Aid Meets

Schedule of first aid meets to be held by Industrial Collieries Corp. this coming summer includes the following: Heilwood, Pa., May 28; Johnstown, Pa., June 1; Marianna, Pa., June 4; Barrackville, W. Va.; June 6; and Sabraton, W. Va., June 7. All of the meets are scheduled for 1.30 in the afternoon, except for the one at Johnstown, which will be held at 10 in the morning.

Deep Development at Davis-Geneva Mine by Oliver

Oliver Iron Mining Company has completed preliminary work for a major underground development at its Davis-Geneva iron mine on the Gogebic range at Ironwood, Mich.

The company plans to start a new haulage drift on the 32nd level in the near future, which will be 4,200 ft. long with a 10 x 11-ft. cross-section. Ventilation raises amounting to a linear length of 2,000 ft. will connect the 32nd and the 30th levels. The present depth of the shaft is sufficient to provide for the new level, and no additional sinking will be necessary. It is estimated that completion of the new development work will require from two to three years.

Preliminary work on the 32nd level, now completed, consists of the cutting of a station and the erection of spill pockets.

Unusual interest is being shown in this new work because of its great depth.

Stripping Program at Morenci

Stripping operations in the open-pit mine at the Morenci Branch of Phelps Dodge Corporation continued on schedule during 1939, according to Louis S. Cates, president, in his report to the stockholders.

At the end of 1939, a total of 16,567,541 tons had been removed, of which 8,868,278 tons was moved during 1939. There remain approximately 25,000,000 tons of waste to be moved before mining operations commence. Shovel operations were concentrated mainly on the south side of Clay Mountain, in the Colorado and Liverpool areas, opening up benches to meet the railroad construction schedule. The bulk of the waste was used to make fills on the railroad which will connect the open-pit mine with the reduction works. Loading and haulage continued with electric shovels and 22½-cu.-yd. dump trucks.

A total of 574,212 tons of material was mined from the area in which ore has been exposed in the pit; this work produced 449,548 tons of ore, which was delivered to the test mill by 5-yd. trucks. Construction of the railroad was pushed throughout the year. Including the main line and the switchbacks in the pit, approximately 22,900 ft. of track was laid in 1939.

Preliminary excavation and grading for the new reduction works was started in November. New pit equipment purchased included two electric shovels and five Diesel-electric locomotives, four of which were put in temporary service at Ajo. Test mill operations were started early in April and continued steadily throughout the year. Tests of old and new equipment were conducted in all units of the concentrator from which conclusive information is being obtained. Further experimental work on crushing, grinding, classification, and flotation equipment is being continued this year.

At the company's *New Cornelia Branch*, operations were continuous during the year with the exception of the usual seasonal shutdown in summer. At the open pit, there were mined 6,113,840 tons of ore and 7,164,148 tons of waste, of which 1,521,400 tons came from the Arkansas Mountain stripping operations. The waste ratio of 1.17 was the same as for the previous year, 0.92 being in the pit and the Arkansas Mountain operation contributing the balance. Broken ore reserves were greatly increased during the year. The efficiency of shovel loading increased, blasting practices were improved, and general operating efficiencies were well maintained. During the latter part of the year, four Diesel-electric locomotives, purchased for the Morenci Branch, were under test to determine their adaptability to pit haulage. Two additional electric shovels were purchased.

The concentrator treated 6,107,206 tons of ore. On this increased tonnage the operating costs were slightly reduced, but the over-all extraction suffered because of a larger proportion of refractory ore treated. Power plant operations were on a routine basis throughout the year, with slightly improved costs and an increased output. The work of concreting the shafts and the erection of new steel headframes at the water wells was completed before the end of the year.

KINNEAR HEADS PROGRAM COMMITTEE FOR METAL MINING CONVENTION

J. C. KINNEAR

Plans are getting well under way for the 7th Annual Metal Mining Convention and Exposition of the American Mining Congress, Western Division, to be held at the Broadmoor Hotel, Colorado Springs, September 16-19.

Shortly after the recent election of Merrill E. Shoup, president of the Golden Cycle Corporation, as Chairman of the Board of Governors, Western Division, the chairmanship of the general program committee was accepted by J. C. Kinnear, general manager, Nevada Consolidated Copper Company, McGill Nev. Under his leadership a full committee is now being appointed composed of prominent men in the metal mining industry—men who are thoroughly conversant with the vital problems facing the industry today, including economic, legislative, tax and operating subjects.

Hundreds of suggestions for interesting topics to be included on the program are now being received and will be given careful consideration by the Program Committee.

Arrangements committees charged with formulating plans for the comfort and enjoyment of all convention visitors are likewise being organized.

Linked inseparably with the Convention is the Exposition of latest metal mining equipment and supplies, assembled by the nation's leading manufacturers. Judging from reservations already received, this year's Show will be the best ever staged for the metal mining industry.

Further details on plans for the meeting will appear in subsequent issues of the JOURNAL. Watch for them, and mark the dates and place of this leading metal mining event on your calendar NOW!

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Aerial Tramways in Metal Mining Industry

Aerial tramways in the metal mining industry are the subject of a report just issued by the Bureau of Mines, Department of the Interior. The paper, which deals mainly with construction and operating costs, is the second of two papers relating to aerial tramways. The first paper described construction practice and discussed some of the engineering principles involved in construction and design.

The paper is based largely upon data supplied by operators of tramways in the United States, Canada, Alaska, and Mexico. Each phase of construction and operation is taken up separately and discussed in detail with regard to costs. Construction practices used in preparing underground workings for the operation of aerial tramway carriers at underground loading stations are also briefly reviewed. A number of individual tramways are described, and detailed construction and operating costs are shown for most of them.

In conclusion, the paper deals briefly with comparative costs of aerial tramway and truck transportation. It also points out some of the reasons why aerial tramways have fallen into disfavor with metal-mine operators in recent years.

Tax on Bituminous Code Members Upheld

• Coal Division Sets May 27 as Date for Oral Price Arguments

The validity of the provision of the Bituminuous Coal Act which levies a 1 cent per ton tax on the production of bituminous coal has been upheld by a three-judge statutory court at Indianapolis, Ind. This is the first court decision on this provision. The court also held that no injunction could be issued to restrain collection of this tax, because the Internal Revenue Code forbids injunctions against collection of taxes.

This case was filed by the Winslow Coal Corporation of Petersburg, Ind., which sought to restrain the Collector of Internal Revenue for Indiana from collecting the 1-cent tax levied on all coal production and the 19½ percent tax levied on the sale of coal by non-code members. The company contended that the tax and other provisions of the Coal Act violated its constitutional rights. The court only considered the validity of the 1-cent tax, holding that there was no other issue before it upon which it could act. The plea for the restraining injunction was dismissed.

Still pending in the Supreme Court of the United States is the Sunshine Anthracite Company case which involves the entire question of the constitutionality of the Guffey Act. Final decision in this case may be reached this spring.

Director Howard A. Gray of the Bituminous Coal Division of the Department of Interior will begin hearing oral arguments on exceptions to recommended minimum bituminous coal prices on May 27. Division trial examiners, after months of public hearings, filed a 4,000-page report with the Director on April 13. This report contained recommended minimum prices at the mine for substantially all of the bituminous coal produced in the United States.

Following the oral arguments, Director Gray will determine the minimum prices and set the date for them to become effective. Interested parties disagreeing with the Director's price determination may appeal to Secretary Ickes who will review the Director's determination.

Early in May, Director Gray issued an opinion dealing with the validity of sales contracts calling for refund of a portion of the sales price in the event "minimum at-the-mine" prices are found by the courts to have been improperly established. The opinion sets forth that such agreements are valid since they are not in violation of Section VII, Rule 1 (h) of the established Marketing Rules and Regulations, which provides:

"No sale, delivery, or offer for sale of coal shall be made upon any condition, express or implied, that any portion of the sale price may be withheld by the buyer, or deposited in escrow, pending or based upon a determination of the constitutionality of any provision of the Act, of the jurisdiction of the Coal Commission, or the validity or applicability of any order of the Coal Commission."

The Director's opinion relative to refund agreements stated that since such agreements are not specifically prohibited under the terms of the regulation, a code member or dealer may lawfully make such provisions in the sale of bituminous coal.

The Bituminous Coal Division is reorganizing a major part of its statistical machinery to provide necessary information for securing compliance with minimum "at the mine" prices and marketing rules for stabilizing the marketing of bituminous coal.

A committee representing coal producers met in conference with Division officials to work out an effective plan for collecting statistical information which will be the most practical for the coal industry to follow.

The Division now is studying a compliance problem involving about 13,000 producers in about 30 states whose coal will be subject to minimum prices. Under the Coal Act, these producers are required to submit to the Division data covering all sales transactions to show the distribution of their coal, the price charged and other such data. This necessitates the filing of producers' invoices, credit, debit and other such memoranda.

"This data is required under the law in order that the Division may follow sales transactions in assuring compliance, and for checking up on the minimum prices to see that they are actually giving the coal industry its approximate cost of doing business, as required by the law," Division Director Howard A. Gray said.

"As the filing of this information will cost the coal industry money, I have asked the industry, through the Bituminous Coal Producers' Boards Conference Committee, to sit down with Division officials and work out an effective statistical plan which will be generally satisfactory.

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American Zinc Institute Meets

The American Zinc Institute held its twenty-second annual meeting at the Hotel Statler in St. Louis, Mo., April 29 and 30.

At the opening session Monday morning, reports were given on the various activities of the Institute during the past 12 months, and an objective discussion of the Reciprocal Trade Agreements program was introduced by Walter R. Peabody, secretary of the American Tariff League. W. A. Janssen, chief of the metals and minerals division of the Bureau of Foreign & Domestic Commerce, described the work of the Bureau in its relation to the metal industry.

On Monday afternoon, R. S. Smethurst, associate counsel of the National Association of Manufacturers, reported upon the legislative situation in Washington and Joseph T. Hall, secretary of the Callahan Zinc-Lead Company, reviewed the current foreign zinc concentrate situation. H. H. Wanders, market-editor of the *Engineering and Mining Journal*, covered the domestic zinc market. C. R. Maxon, of the New Jersey Zinc Company, reviewed the past 10 years of progress in zinc alloy die castings.

Topics for Tuesday morning included several interesting phases of the farm market for galvanized products. Paul Huey, of *Progressive Farmer*, spoke on Significant Changes in the Farm Market; Developments in Metal Farm Buildings were discussed by Stephen Mahon, of the James Manufacturing Company; T. W. Billings, representing Cooperative G. L. F. Farm Supplies, Inc., talked on Steel Distribution in the Farm Field, and a progress report on the Institute's farm stock tank tests was also presented.

Technical subjects discussed Tuesday afternoon included Progress in Electrogalvanizing, by J. A. Singmaster; Developments in Hot Dip Galvanizing, by J. L. Schueler, general superintendent of Continental Steel Corporation; and the Differential Density Process, by Elmer Isern, chief metallurgist of the Eagle-Picher Mining & Smelting Co.

Reelected officers of the Institute included Howard I. Young, president; C. Merrill Chapin, Jr., James O. Elton and John A. Robinson, vice presidents; John L. Good, treasurer, and Ernest V. Gent, secretary.

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Oliver Announces Iron Ore Price Base

Oliver Iron Mining Company, Duluth, Minn., has announced that they will accept business for 1940 delivery on the basis of $4.45 per gross ton for Mesabi Non-Bessemer ore delivered at lower lake ports.

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Illinois Boat Trip

The twenty-second annual boat trip and summer meeting of the Illinois Mining Institute will be held aboard the S.S. *Golden Eagle*, leaving St. Louis on Friday evening, June 7, and returning to St. Louis on Sunday morning, June 9.

On Saturday, June 8, President Roy L. Adams will welcome those in attendance, following which technical papers will be presented as follows:

Relations of the Development in Illinois Oil Fields to the Hazards of Coal Mine Operations, by William J. Johnson, state mine inspector, Tenth Inspection District, Christopher, Ill.

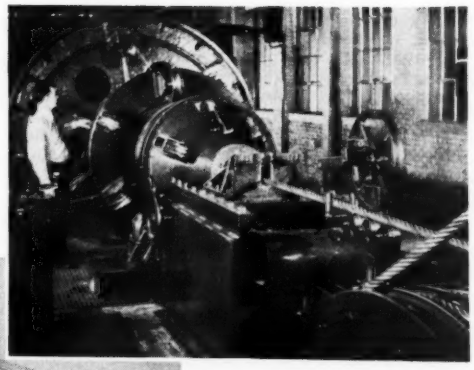
Coal Cleaning and Preparation, by F. A. Lyons, Pyramid Coal Corporation, Pinckneyville, Ill.

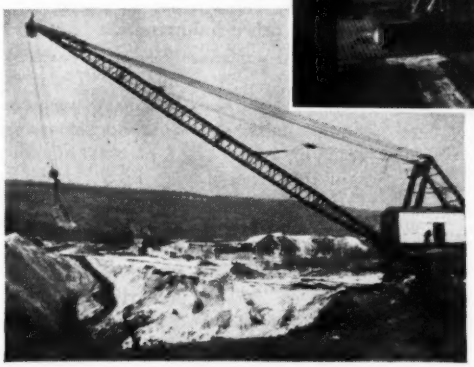
Underground Trucking, by H. C. McCollum, Allen & Garcia Company, Springfield, Ill.

Modern Underground Methods, by A. K. Hert, general superintendent, Snow Hill Coal Corporation, Terre Haute, Ind.

M. M. Leighton is vice president of the Institute, and B. E. Schonthal its secretary-treasurer.

Motion Picture to Show Making of Wire Rope





Bethlehem Steel Company, which added the manufacture of wire rope to its activities three years ago, is now completing an industrial motion picture on the making and use of this product. With the acquisition in 1937 of the Williamsport Wire Rope Company, Williamsport, Pa., now the Williamsport Division, Bethlehem became one of the few manufacturers of wire rope having its own steel making facilities.

Beginning with the handling of the iron ore, the new picture "Sinews of Steel," will show the principal operations in steel making, placing particular emphasis on the fact that steel for wire rope is made especially to meet the requirements of that product. The rolling of rod from the billet on high-speed continuous mills and the processing of rod into wire for making into wire rope are covered in detail. Close-ups and sectional views of wire drawing operations show the drawing of wire to the smallest sizes.

The principle of wire rope making is shown in the sequences taken in the rope mill, where the course of the wire is followed as it is formed into strand and the strand into rope. By means of close-ups and engineering drawings, the intricacies of wire rope engineering are touched on in an effort to make the picture as good a source of information on the subject as is possible. Illustrations of the many uses to which wire rope is put in industry are also included.

The motion picture is being made at a most opportune time, for, during the past year a number of changes and improvements have been made at Williamsport increasing the efficiency and capacity of the plant. A new cleaning unit used in the preparation of rod for drawing into wire has recently been put in service, and a number of additions of equipment and changes in existing machines made in the strand and rope making departments. Several new rope making machines have been installed, which, with other additions have increased the capacity of the plant for the larger sizes of rope.

"Sinews of Steel" will be a sound film, four reels in length and in 16 mm. size. It is being made for presentation at meetings of jobbers and dealers, technical societies, trade associations, and college and representative civic groups.

New Coal Operations in Logan County

Organization of a new coal company to operate 1,000 leased acres near Logan, W. Va., was recently announced. The new company, with the backing of Cincinnati financial interests, will be known as the Snap Creek Coal Company, and has been granted incorporation papers in both West Virginia and Ohio.

According to an announcement by E. J. Payne, vice president in charge of operations of the new company, in Huntington, construction work incident to actual operation will begin at once, with the expectation that production can get under way by spring.

The mine will be fully mechanized and will have a yearly production of about 200,000 tons. The property includes the Alma seam and adjoins workings of the Gay Coal & Coke Company, situated on the outskirts of the city of Logan.

Other officers of the concern are J. H. Rhodes, president, and A. J. Russell, vice president, both of Cincinnati, Ohio.

1940 Edition of Metal Statistics

Publication of the thirty-third annual edition of this valuable and well known statistical record was recently announced by the publishers, American Metal Market, 111 John Street, New York City. Already replete with useful information on ferrous and non-ferrous metals and miscellaneous economic subjects, the new issue contains many added features, while a number of refinements have been made in other directions.

In the iron and steel section, due to the constantly growing importance of scrap materials in the general picture, statistics are given of the annual consumption of steel scrap in steel making in the United States, as are also figures on the amount of pig iron used for the same purpose. Other new tables show the exports of galvanized sheets for a number of years by destinations; apparent consumption of tin plate by most of the world; monthly average prices of ferrosilicon; and domestic production of hot rolled alloy steel, which, together with data previously introduced on stainless steel, constitutes the aggregate of all alloy steel production.

In the non-ferrous metals group, new tables have been added in the copper section recording the monthly domestic sales by the primary producing interests monthly receipts of scrap by the custom refiners and a record of price changes on electrolytic. In the tin section, information on domestic consumption has been further augmented by the addition of statistics showing its use in greater detail than heretofore. Elsewhere in this section will be found the annual domestic mine output of tin beginning with the earliest year of record.

Mining Methods and Costs at Cripple Creek Gold Producer

Mining methods and operating costs at the South Burns Shaft of Golden Conqueror Mines, Inc., in the Cripple Creek District, Colo., are described in a paper just published by the Bureau of Mines, United States Department of the Interior. It is one of a series comprising some 300 or more reports presenting comprehensive data on mining or milling methods and costs at representative mining operations, published for the purpose of disseminating practical information of this nature for the benefit of the mining industry.

The South Burns Shaft is operated by Golden Conqueror Mines, Inc., through which parts of the properties of the Acacia Gold Mining Co., The Free Coinage Gold Mining Co., and The United Gold Mines Co., are worked under lease.

During 1938, 30,773.61 dry tons of ore averaging $9.58 in gold per ton was mined. Of this, 10,138.439 tons, averaging $10.65 per ton, was produced on company account; and 20,635.171 tons, averaging $9.05 per ton, was produced by split-check lessees.

All work is done through a vertical, two-compartment shaft, 1,575 ft. deep. Each compartment is 4 x 4 ft. inside and is timbered with 3 x 8-in. cribbing.

Thirteen levels, at irregular intervals, had been driven by former operators; present exploring is done in virgin areas on these old levels. Drifts are 5 x 7 ft. and raises 4 x 8 ft. in cross section; where necessary, full-sized intermediate drifts are from

raises. No timber is necessary, except for chutes and manways.

The wall rocks are hard and stand well and are suited to two methods of stoping—open stopes and shrinkage stopes. Flat ore bodies are mined by open stoping, leaving casual pillars to support the back. Narrow vertical ore shoots, extending a short distance above a level, are mined by open-stoping, whereas wide vertical ore shoots are mined by shrinkage stoping.

Ore is loaded from chutes or shoveled into 16- and 18-cu.-ft. mine cars and trammed over 12-lb. rails to the shaft station. Here it is dumped into a duralumin skip of 42 cu. ft. capacity and hoisted to the surface. A single drum, 150-hp., electric hoist takes the load to the surface at 630 ft. per minute; the ore is dumped into a shaft hopper, from which it is trammed to the proper bin. Bins are equipped with grizzlies, screens, and sorting tubes; very little hand-sorting is done.

Royalties, freight, and treatment charges vary with the grade of carload lots, and the preparation of the ore in the ore house has an important bearing on the net return to the shipper.

Ore from the bins is trucked by contract to the railroad and shipped to the Golden Cycle Mill at Colorado Springs.

Because the ground stands well, nearly 100 percent of the ore is extracted in vertical stopes. On the flat stopes about 18 percent of the ore is left in pillars, much of which will be mined later.

All work at the South Burns Shaft is done under lease or on company account.

Company costs are calculated against ore produced by company operations only, but mine average costs include both company and lessee expense and are computed against all ore hoisted. During 1938, the average cost of mining was $3.471 per ton of ore hoisted. The cut-off grade for ore is 0.20 oz. gold per ton.

Copies of this report, Information Circular 7094, "Mining Methods and Costs at South Burns Shaft of Golden Conqueror Mines, Inc., Cripple Creek, Colorado," may be obtained from the Bureau of Mines, Washington, D. C.

West Virginia Short Course in Coal Mining

The Twenty-eighth Annual Short Course in Coal Mining will be held at the School of Mines, West Virginia University, Morgantown, and at the high schools at Mt. Hope and Welch, from June 10 to July 20, 1940. Registration begins June 5.

This short course has at least two definite objects—to help the mining men of West Virginia secure their certificates of competency as mine foremen or fire bosses, and to give each man a thorough knowledge of safe and efficient mining, together with information on newly developed methods and practices.

Subjects to be offered in the six weeks' course include: (1) mine laws of West Virginia, (2) mining arithmetic, (3) explosives, (4) electricity, (5) drawing, (6) mine gases, (7) methods of mining, (8) mine fires and explosions, (9) drainage and pumping, (10) timbering, (11) mine foremanship, (12) safety lamps, (13) mine ventilation, and (14) haulage.

For further information, address D. L. McElroy, director, school of Mines, Morgantown, W. Va.

Lone Star Reopens Tri-State Mine

The old Foch mine—a property about a mile northwest of Cardin, Okla., that has been operating intermittently on three different levels during the past few years by different companies—has been reopened by the Lone Star Mining Company. Mining operations were started there late in March.

It is reported that the company has opened a good deposit of zinc and lead ore on the 230-ft. level, and is also mining on the 260-ft. level. An old derrick and large hopper already over the shaft are being utilized.

Ore will be hauled to the Central mill of the Eagle-Picher Mining and Smelting Company for treatment.

Treasure Island Revamped

Treasure Island, man-made site of the Golden Gate International Exposition in San Francisco Bay, is a scene of great activity as preparations are under way for the re-opening of the World's Fair on May 25.

The Fair of 'Forty will be a completely revised version of the pageant of 1939. There will be a new lighting and color scheme for day and night; there will be new headline attractions, including "name" bands and stars of radio, stage and screen; there will be new exhibits, with greater variety; there will be symphony and swing; and the gayway bright lights will reveal a completely changed fun zone for thrills and frolic.

The gardens of the exposition, which were a fairyland of beauty last year, will be even more enchanting in 1940 with hundreds of thousands of new plantings and a vivid assembly of blooms from every part of the Pacific area.

Exhibit palaces and esplanades survived the rains and winds of the winter season well, and the electricians, under the direction of color architect and engineers, have placed new flood-lights and fluorescent tubes for indirect illumination of walls and columns and domes.

"The exposition of 1940 will be a new show," stated William W. Monahan, General Manager. "As plans are rapidly taking shape and the pace of construction operations quickens, the second edition of 'Treasure Island' is directing the eyes of the nation again to San Francisco. With the cooperation of Federal, State and county governments, the new pageant of the Pacific will be a more beautiful affair than its predecessor."

National Legislation Affecting Coal Mining

(*Continued from page* 21)

because these matters affect the very life-blood of the coal industry. Time does not permit a discussion of many other federal measures, either on the statute books or being considered by Congress, which affect both coal mining and other industries.

Present day taxes bear with particular severity on coal mining. The payroll taxes for social security purposes (now totaling 4 percent and eventually reaching a figure of 6 percent, in addition to the employee's own contributions to Old Age Benefits) are a disproportionately heavy charge against an industry in which nearly two-thirds of the production cost consists of wages to labor. Similarly, the gross sales taxes imposed in many States work an undue hardship on an industry where the margin between cost and sales is so minute or completely absent. Further, whether we do or do not make a profit, we are faced with many intricate problems in corporate tax returns; and we must be constantly on guard to secure recognition of the special character and needs of the mining industry, and to protect it against legislative and administrative inroads in Federal tax-taking procedure.

The National Labor Relations Act has made trouble for some coal producers who, through no fault of their own, have become involved in controversies between rival labor unions; and the Wage-Hour Act has caused serious hindrance to safety and first-aid training as well as dfficulties in connection with the routine handling of employees' payroll deductions.

The affairs of the anthracite and bituminous coal industry are deeply involved in the legislative and administrative actions of our National Government, and we should all realize that we of the industry—which means each one of us—must be ever on the alert to express ourselves promptly and forcibly to the members of Congress in time of need. Most of these problems are common to all the natural resource products, including the metals and non-metals as well as coal, and it is highly important that we maintain a solid front in protecting the interests of the whole mining industry, and of the millions of men, women and children whose livelihood is at stake.

PERSONALS

Dr. R. R. Sayers has been appointed Director of the Bureau of Mines by President Roosevelt, the appointment having been sent to the Senate May 13, and it was immediately referred to the Senate Mines and Mining Committee for consideration.

DR. R. R. SAYERS

The President had previously appointed Doctor Sayers as acting director of the Bureau on April 5, at which time he took over his new position immediately.

Dr. Sayers is senior surgeon of the United States Public Health Service, in which organization he has served since 1914. He was made chief surgeon and chief of the health and safety branch of the Bureau of Mines in 1917, in which capacity he served for 15 years during which he worked extensively with mining problems. In this position he became well known in the mining industry and supervised mine activities at the scene of operations in every part of the nation. Since 1932, when the Bureau of Mines took over its own safety work, Dr. Sayers has been in charge of the office of industrial hygiene and sanitation for the Public Health Service.

Edmund A. Oswald has been assigned to the New York office of The Koppers Coal Company as a salesman, according to an announcement by **Walter Rothenhoefer**, general manager of sales.

John J. Curzon, manager of the Chelan Division, Howe Sound Company, at Holden, Wash., and **C. O. Dunlop**, president of the Northwest Mining Association, Spokane, Wash., are newly elected members of the Board of Governors of the Western Division of the American Mining Congress.

L. E. Block has resigned as chairman of the Board of Inland Steel Company after having served in that capacity for more than 20 years, and is now chairman of the executive committee. **Edward L. Ryerson, Jr.**, has been named chairman of the board, succeeding Mr. Block. **P. D. Block**, president, was reelected, together with all other officers and directors.

R. C. Jones has been appointed traveling coal traffic agent for the Chesapeake & Ohio Railway Company, with offices in Detroit, Mich.; and **T. J. Fitzpatrick** has been made traveling coal traffic agent for the same company, with offices in Richmond, Va. Mr. Fitzpatrick succeeds **R. C. Jones**, promoted. The appointments were effective May 1.

James F. McCarthy, Jr., superintendent of the Polaris Mining Company, has been elected director of that company.

Cornelius F. Kelley relinquished the presidency of Anaconda Copper Mining Company April 30 to become chairman of the Board of Directors, and was succeeded as president of the company by **James R. Hobbins**, who had been executive vice president. The position of chairman of the Board had remained unfilled since the death of **John D. Ryan** in 1933.

C. F. KELLEY

Robert E. Dwyer, vice president and treasurer, was elected executive vice president, succeeding Mr. Hobbins.

J. R. HOBBINS

Mr. Kelley had a long career with the Anaconda Company and its predecessor companies, embracing a great variety of work in and around the company's mines in Butte, Mont. After serving with the company's engineering department he interrupted his career for courses in engineering and law at the University of Michigan, and prior to his return to the Anaconda Company as a member of the legal staff in 1901, he practiced law in Butte, and for a time served as chief deputy county attorney.

Mr. Hobbins, a native of Madison, Wis., is a director and officer in many of Anaconda's affiliated companies. He joined the Anaconda Company as assistant to the president in 1922, previous to which he had been with the Montana Power Company. He will continue to maintain his office in New York City.

Mr. Dwyer's association with the Anaconda Company dates from 1904. Following 14 years' work in various capacities in Butte, he went to New York in connection with general auditing work for the company, and was made general auditor in 1923. In 1926 he was elected vice president, and in 1932 he was elected treasurer of the company.

J. W. Furness retired from government service May 1, after more than 20 years of active study and administrative work intimately related to the mineral industry in Washington. He has been in ill health for several years, and his application for disability retirement has been granted by the Civil Service Commission.

Shortly after the war, Mr. Furness joined the Bureau of Mines as a specialist in the study of strategic minerals, and later was transferred to the Bureau of Foreign and Domestic Commerce as chief of its minerals division. In 1934 he was transferred back to the Bureau of Mines as chief of the economics branch, which position he held up to the time of his retirement. For years he has strongly advocated adequate stock-piling of strategic minerals by the government, and finally saw this program initiated last year, although in modest proportions.

—*Obituaries*—

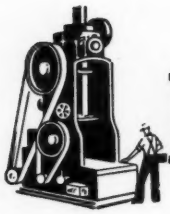
Charles W. Corfield, electrical engineer of the Utah Copper Company until his retirement nearly two years ago, died in Salt Lake City, February 23, at the age of 74. Upon his retirement in May 1938 he was succeeded by his son, **Raymond J. Corfield**.

Charles W. (Ted) Adams, mining engineer, died at his home in Los Angeles, Calif., April 27 at the age of 50, following a heart attack. Mr. Adams was widely known for his activities in mining, not only in the United States, but in Canada and Mexico. At the time of his death he was associated with the Cyprus Mines Corporation.

Professor Frank H. Probert, mining expert and dean of the University of California College of Mining, died May 7 at the age of 64.

Professor Probert was a former engineering research expert for Phelps Dodge & Co., and was a consulting engineer for many years in Los Angeles. He became professor of mining at the University of California in 1916, and was appointed dean of the College of Mining there a year later.

P. W. George, manager, Buchans Mining Company, Ltd., Buchans, Newfoundland, died in April while on a trip in the woods. Mr. George's experience included work in Sweden, Norway, Mexico and British Columbia in addition to his connections with Federal Mining & Smelting Company in Idaho and Joplin, Mo. He has been manager of the Buchans property since 1929.

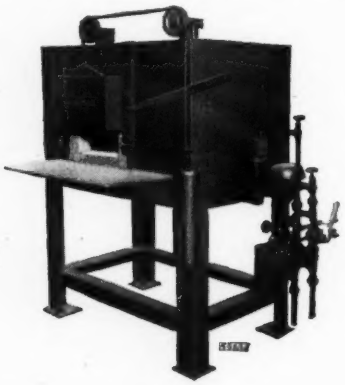


MANUFACTURERS' Forum

Jackfurnace

Ingersoll-Rand announces the new "Jackfurnace" for the rapid heating of their detachable rock drill bits known as "Jackbits." Designed especially for the servicing of Jackbits, it can be used with either Jackmills (hotmills) or grinders. It can also be used for heating shanks and rod ends for hardening.

Low-pressure air from an induction blower passes through a pre-heating chamber before entering the burner, thereby aiding combustion and increasing efficiency. Convenient con-



trols enable the operator to attain the proper mixture of oil and air. The furnace can be equipped with an automatic temperature control device.

When heating Jackbits for rehardening, the Jackfurnace will handle approximately 180 Jackbits per hour.

It is well insulated to insure low room temperature for the operator. The manufacturer furnishes, as standard equipment, a loading spoon and an unloading device to facilitate the handling of Jackbits to and from the furnace.

Copies of the description sheet, Form 2609, are available from Ingersoll-Rand Co., 11 Broadway, New York, or any of their branch offices.

Multiple Oil Film Bearing

Koppers Company, Bartlett Hayward Division, Baltimore, Md., has just issued a booklet describing its new Fast's multiple oil film bearing, for which United States rights were obtained last summer from Gustave Fast, famous designing engineer, who also designed the Fast's coupling which Bartlett Hayward has manufactured for many years.

The booklet outlines the history of bearings, discusses the principle of Fast's bearing, describes and illustrates its design, provides tables of dimensions and load capacities, dimensions of standard bearing housings, recommended shaft sizes, dimensions of lock nuts and proper oil levels.

This bearing, like the Fast's self-aligning coupling, carries the load on a plurality of perfect wedge-shaped oil films which prevent metallic contact and wear and eliminate vibration and noise. It employs the hydrodynamic theory of lubrication, based upon Sir Isaac Newton's law of viscous resistance of liquids.

The load-bearing wedge-shaped oil films are automatically maintained over the full bearing surface, since each bearing is so designed that it acts as a centrifugal viscous feed pump, drawing the oil from the bearing housing reservoir and distributing it throughout the bearing. A surplus of oil is circulated and acts as a cooling medium, eliminating high local temperatures in the oil film.

It is stated that these bearings, in a sealed housing, will run continuously for a year on a single filling of oil. Load capacity is said to increase with speed and is normally as great as that of the shaft. The bearings are also said to provide high operating economy because of their long life, minimum depreciation, and low oil consumption.

New "Lo-Amp" Motor

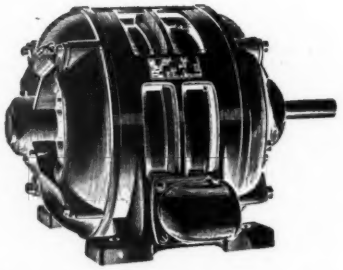
The Louis Allis Company, Milwaukee, announces a new "Lo-Amp" electric motor that is especially designed for use on refrigerating and air-conditioning and similar installations.

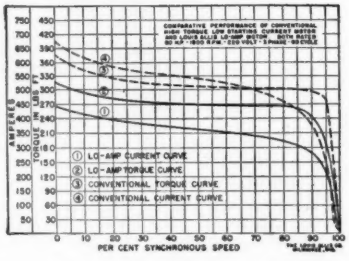
This unusual new motor has low locked rotor current—and can be supplied with either high starting torque or normal starting torque. It has all of the rugged simplicity of a standard squirrel-cage motor.

The new motor does not have any centrifugal switches, relays, brushes or slip rings, and does not require any expensive special control to operate—such as multi-step starters.

Curves 1 and 2 on the chart show the inrush current and starting torque of the new Lo-Amp motor as compared with curve 3 and 4, which show the corresponding data on a standard double-deck squirrel-cage motor.

The inherent ruggedness, simplicity, high starting torque, and low locked





rotor current of this new motor make it perfectly adapted for refrigerating, air-conditioning, and similar applications.

For further information, address the Louis Allis Company, Milwaukee, Wis.

Link-Belt Conveyor Book

A new 48-page 8½ by 11 in. copiously illustrated Book No. 1700, entitled "Link-Belt Conveyors in American Industry," has been published by Link-Belt Company, 307 North Michigan Avenue, Chicago.

Besides being a picture book of many different applications of mechanical elevating and conveying equipment for handling both packages and loose bulk materials, the book contains several pages of statistics and thought-provoking reading matter on the theme that it is very largely the greater development and use of machines that has placed America in the forefront of all nations.

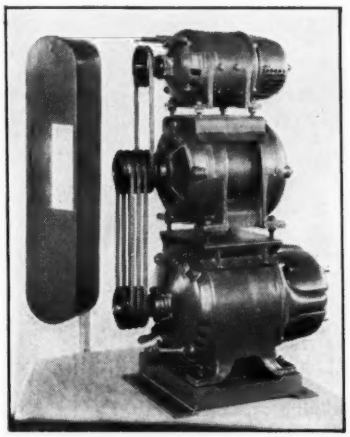
Credit is given to conveyors for helping American industry to produce more things for more people, at lower cost. Easy-to-understand charts show how much better the American worker fares than do workers of other countries. Says the book, "People can and do buy more here than anywhere else in the world because, with machinery, American industry is multiplying the purchasing power of wages."

Particularly recommended by Link-Belt as a book of ideas for any who are interested in handling raw materials, work in process, and finished goods of whatever sort, with greater facility and at lower cost, this book will be sent gratis to interested readers, upon request made on business letterhead.

Pyramid-Mounted Motor Generator Set

Saving in floor space, accessibility, and the use of machines of different speeds are outstanding features of a new pyramid-mounted arrangement of three-machine motor-generator sets developed at the Norwood, Ohio, works of Allis-Chalmers Mfg. Co. The generator, motor and exciter, each a self-contained machine, are assembled one above the other, thus requiring floor space equal only to the generator mounting dimensions.

On top of the generator is placed the induction motor, securely attached with suitable base plate, and the exciter in like manner is mounted on top of the motor. The generator and exciter are driven by texrope V-belts from the motor shaft, adjustment be-



ing provided in the motor and exciter base plates. Motor-generator sets of this type are at present available in sizes up to and including 10 kilowatts.

Each machine of the set is self-contained and readily removable as a separate unit. Therefore, in case of emergency, and where the particular piece of equipment which the M/G set operates is not required, any of the three machines could be readily removed and used for other purposes.

In the pyramid arrangements also, machines of different speeds may be used. Thus a direct current generator of standard speed may be used with a 25 cycle, 50 cycle (or any other frequency) induction motor by merely using the corresponding required speed ratio in the texrope V-belt drives. The weight of a pyramid mounted set is also said to be less than one of conventional mounting, due to the saving of material in the base.

Symons Rod Deck Screen

The Symons rod deck screen is a new development in screening equipment, especially adapted for removing fines from wet, sticky materials. The outstanding feature of this screen is its screening surface, consisting of spring steel rods instead of some form of wire mesh as commonly used. These rods create long slotted openings which permit rapid removal of fine material, and do not clog even when the feed is wet and gummy. For this reason, this screen finds its greatest application in the mining field, but it can also be used wherever the sizing is not confined to square openings.

This new type of screening surface is of particular interest, not only because of its ability to handle a big tonnage of sticky ore but the cost of maintenance is far below that of any other type. The individual spring steel rods can be inserted in a few seconds simply with the hands, no tools being required. Any rod or group of rods can be replaced without disturbing the rest of the screening area. Only the worn portion of the surface need be replaced. This can be done in a few moments by taking off the covers which allow access to the screening surface, the worn rods removed and the new rods sprung into place. The long life of the rods, minimum labor required for replacement, and big capacity of this screen, all combine in enabling this screen to show a remarkably low cost of screening, especially with materials that are difficult to screen. The rod deck screen is built by the Nordberg Mfg. Co. of Milwaukee, and is available in two sizes; namely, 3 by 8 ft. and 4 by 8 ft.

General Electric Announces Changes In N. Y. World's Fair Exhibit

Construction work on extensive changes in the General Electric exhibit at the New York World's Fair for 1940 is under way, H. H. Barnes, Jr., commercial vice president, has announced.

"The changes in the General Electric exhibit for 1940," Mr. Barnes said, "are aimed principally to take care of the traffic jams which we encountered in certain parts of our building on busy days last year, and to provide enough new entertainment to enable us to invite some of the 8,000,000 people who visited us last year to come back again.

"Space for viewing our television demonstrations proved to be entirely inadequate for the demand in 1939, and we are doubling the available space and number of television receivers. Another feature which was more popular than we had anticipated was the 'Magic Kitchen.' We are going to build a small theater which will accommodate a greater number of people more comfortably. The appliance division is also working on several other new demonstrations, and this part of our exhibit will be altered completely."

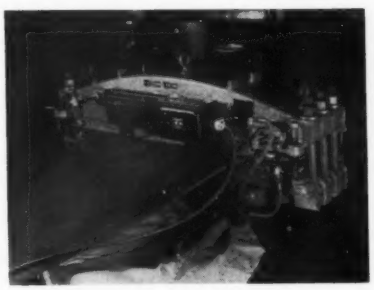
A spectacular addition to General Electric's "man-made lightning" display in Steinmetz Hall is being developed by Dr. K. B. McEachron, director of the G-E high-voltage laboratory in Pittsfield, Mass.

W. A. Gluesing, director of the original "House of Magic" show at Chicago's Century of Progress and of the 1939 New York World's Fair show, is also preparing new features for the 1940 edition of the "House of Magic."

Conveyor Belt Vulcanizer

For years the B. F. Goodrich Company has been a leader in the progressive development of equipment and technique for making vulcanized splices and repairs to conveyor belting on the conveyor. The company now announces an addition to its line of belt vulcanizers, designated as the 36-42. The vulcanizer is made for Goodrich by the James C. Heintz Company.

The new vulcanizer has a platen 12 in. wide and long enough to span a 36-in. belt when the vulcanizer is clamped on the belt at approximately a 22½-degree angle with reference to a line drawn at right angles to the



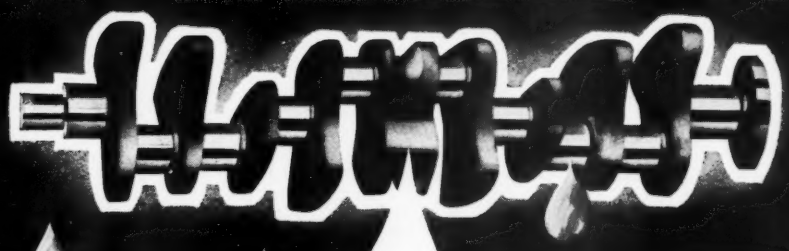
edge of the belt. The vulcanizer also may be used on a 42-in. belt, but it must be placed across the belt at approximately 12 degrees from a line drawn at right angles to the edge of the belt.

Data on the vulcanizer follows: Width of platen, 47 in.; length of platen, 12 in., overall width 54 in., overall length 18 in., overall height 23 in.; total weight, 1,145 lb.; total wattage, 4,000 lb.; total amperage, 110 volts 36.4, 220 volts 18.2. The electric heating load is 4 kw. during the heating-up period.

As with all belt vulcanizers furnished by Goodrich, the new 36-42 is simple and effective in operation. It is plugged in on the circuit as easily as an electric fan, and does not require watching. Equipped with positive thermostats, the proper vulcanizing temperature of 287 degrees Fahrenheit is automatically maintained.

INDEX TO ADVERTISERS

Would you lubricate the bearings?



Then Lubricate WIRE ROPE!

(IT HAS A THOUSAND "BEARINGS" PER FOOT)

A wire rope is a machine and should be so treated. Every component wire bears upon its adjacent wires and in operation they slide and rub against each other. Just as the crank-shaft bearings in your automobile need lubrication, so do these multiple bearing pressures in wire rope.

A penetrating wire rope lubricant properly applied forms a film even on the inner wires and keeps those invisible "bearings" from wearing or corroding. It adds greatly to the life of your ropes, drums and sheaves, and contributes materially to rope safety.

TRU-LAY Preformed rope and the proper lubricant are a perfect team to obtain maximum rope service and economy.

An American Cable Division representative will gladly assist you with your lubrication or other rope problems.

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